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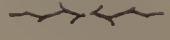
CHO MOMO



RUFUS CHOATE

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CHO MOMO

THE ONE ARITHMETIC

CONTAINS

THE ONLY ONE POSSIBLE UNIVERSAL
NUMERICAL LANGUAGE.

WASHINGTON, D. C. EDITION

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INTRODUCTORY.

Arithmetic, or Momo, is the science of numbers. It is the alphabet upon which all other sciences are constructed. As well expect to read words without a knowledge of letters as to think to advance in science without knowing the value of numbers.

It is said of the ancient Magi that they especially admonished their priests never to reveal truth to the people. They well knew that only mysticism would hold the masses in subjection: revelation of truth equalizes all.

The scientists of this day, descendants of the Magi, have hidden the sacred alphabet of numbers under mystifying words that darken and confuse the novice who dares approach the path that leads to the Temple of Wisdom.

Arithmetic, or Momo, is divided into two grand orders, namely: the abstract, and the concrete. This is in accordance with the universal division of all creation into imponderable and ponderable elements.

The abstract refers to general application, without individualization, as in 1, 2, 3, 4, 5, 6, 7, 8, 9.

The concrete specifies an individual, as: one man, two pounds, three books.

Numbers are also divided into prime units, as: *O*, 1, 2, 3, 4, 5, 6, 7, 8, 9, which are all the existing primes; they are wholly different from prime numbers, which are many; and composite units, which

are of vast numbers, depending on the various combinations of the ten prime units.

There are also prime numbers, and composite numbers. A prime number is one that cannot be farther divided. It is an error to say that it is divided by one, or itself. The one leaves it unchanged as though it had not been tried. The only unit, or entity, (which are identical) that can destroy a prime number, is itself, and there is not another power in the entire universe that can cause this annihilation.

It is wholly wrong to call 4, 6, 8, or 9, a composite number under the supposition that because 4 is the product of 2×2, that while 6 is the product of 2×3, 8 is that of $2 \times 2 \times 2$, and 9 is that of 3×3. This does not make a composite. Each prime unit as 2, 3, 4, 5, 6, 7, 8, 9, owes its existence wholly and alone to the possession of the value of 1. 2, possessing two ones, 3, three ones, 4, four ones, 5, five ones, 6, six ones, 7, seven ones, 8, eight ones, and 9, nine ones.

A composite even number is one that can be divided by 2, or 5, or their multiples. A composite uneven number is one that is divided by another number than 2, or one of its multiples.

A unit is one, a part of one, or a multiple of one.

All creation is divided into two great classes, namely: imponderable and ponderable substances, and every thing must come under one of these two orders.

The cipher represents all imponderable matter, as force, energy, poverty, honor, and in illimitable space has no power, while its ability increases with geometrical ratio as it comes into contact with confinement or resistance, or is adjoined to a unit. Thus standing alone, *o*, is, as it were, nothing, with a 10, it is increased ten fold, confined closer as 100, it is one hundred fold, 1000, one thousand times more powerful; with a 2, it is 20, 200, 2000; with a 5, 50, 500, 5000.

All ponderable qualities must have a standard of unit; that comparison with others can be made. It may be infinitely small, or infinitely large; yet large or small, while ponderable it is material in any and in all quantities. And the imponderable, just as substantial, are immaterial.

Quantity is the measurement of a ponderable element. An imponderable quantity cannot be measured except through the quantity of resistance excited by the ponderable.

The province and use of arithmetic is to measure the varying quantities of ponderable matter. It has nothing to do with the imponderable, except in so far as the imponderable acts upon the ponderable.

Numbers are also known as cardinal, 1, 2, 3, 4, 5, 6, 7, 8, 9, and ordinal, as: 1st, 2nd, 3d, 4th, 5th, 6th, 7th, 8th, 9th. They are whole, as: 1, 2, 3, 4, 5, 6, 7, 8, 9. Fractional, as: ½, ⅔, ⅘, etc., or mixed, as: 1-½, 2-⅔, 3-⅘, etc.

CHO MOMO.

The especial object desired to be obtained in creating Cho Momo is to have a common mathematical language for the entire world; a language any one can speak, and that every one shall speak alike.

This language is called Cho (always pronounced ko) and Momo is the universal arithmetic.

Cho will steadily advance through the alphabet of numbers to the higher mathematics, proving itself thoroughly efficient for a giant's task.

This new language selects none of its constituents from any existing or dead tongue. It arbitrarily, to suit its own genius, advances creating a living, ever-existing, ever-enlarging language.

It is evident to every student of political economy that a one government, some day, not far distant, is to reign over the people. Its coming is promised in the Sacred Word. Its mentalization is shaking thrones and creeds of the present. It will give to humanity the hope of far better things, not because of the asking, but because of the right: not as a favor, but as a principle of integrity; not because humanity is worthy, but because God is good.

That which is to come cannot exist through force. Like truth itself, which cannot come into activity until the false has been thoroughly tried, and has proven its own impotency, the one future govern-

ment will exist because it will be the better way of managing affairs.

Speaking axiomatically, the inevitable is irresistible. Since the coming of a one government is inevitable, an universal language is an essential to its life; therefore, the present Cho system, being an essential, and if it is to be universal, is an equal and possesses the quality of the inevitable, that is to say, it is irresistible.

While it is intended to translate Cho Momo into every known tongue, to give it a lip, and a sign language, the words in the present advance English edition are identical with those that will appear in other translations.

Cho Momo will be introduced in two parts, each copy of which is separately numbered, and there is no duplicate of any number of an edition. If any copy of Cho Momo appears without its individual number, it is without legality, and a duplicate will bring liability to indictment.

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NOTATION.

Notation is the art of writing numbers.

An artist is one who does a thing in an appropriate way.

The right way is always the easiest way; it is the shortest line between two points; hence, the art of writing numbers, is to write them in the most appropriate manner. If any improvement is possible the prior must yield to its successor. It is a law of nature that nothing (mind, man, or matter) can cease existing until a stronger, abler, better or worse, successor drives it down and out.

Also another universal law prevails with which every science must accord, namely: that similars associate and affinities agree.

Also, though not especially applicable to our subject, another: that the environment is forever in the endeavor to reproduce itself. That is to say that every number tries to make every other number like itself.

To agree with the law of association all numbers at all times must be arranged in accordance with their respective units, namely: units with units, tens with tens, and hundreds with hundreds. If this law is not observed, any method of notation starts with an error and must end in failure.

This law of association comes under the mathe-

matical law that equals produce equals, that is to say, if the right is added to the right the result is favorable, but right added to wrong increases the wrong many fold.

Three recognized methods of writing numbers at the present time exist. The Cho method, herewith introduced, will be a fourth.

One, the Arabic method, called by the Cho, *Ala*, has ten prime units, namely: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and a multitude of composites resulting from the various combinations of these ten prime units.

The *Ala* method is universally accepted. It is so beautifully simple and so wonderfully useful that no improvement can be made; hence, it is eternal. It is accompanied by one weakness, not in itself, but in its companion and associate, namely: the words used to express these *Ala* numbers are as various as the faces of humanity, every man speaking unlike the other. It is to correct this defect that the Cho words are created.

The Roman method consists of seven letters used to express certain numbers, namely: I, for one, V, five, X, ten, L, fifty, C, one hundred, D, five hundred, and M, one thousand.

The Roman method is restricted to the commemoration of annual dates: the heading of chapters in books; in manuscript, and on monuments. Its uses are comparatively small and its existence is short.

Also words are employed by each nation and people to express numbers. These words are as

different as the various tongues and produce a babble of confusion.

And now comes the Cho (always pronounced ko) method. It is to make a common mathematical language for all people, for all time. It is to accompany the *Ala,* as a wife her husband, congenial and true, one to the other.

As magnetism is the conjunction of two elements making them one, giving birth to life; and as electricity is disjunction, separating the one into two, causing death: so the Cho method magnetically associates in conjugal bliss with its friend and companion, the *Ala,* as its full equal, with equal responsibilities, equal incentives and equal rewards.

Cho is as compact as *Ala,* its equal in every respect: it is as efficient and what one can do the other can accomplish.

Following are numbers in Cho and in *Ala*: simple, rich, beautiful and true.

THE CHO AND *ALA* CARDINAL NUMBERS ARE AS FOLLOWS:

bi	di	fi	gi	ki	li	mi	ni	pi	ao
1	2	3	4	5	6	7	8	9	10
ab	ad	af	ag	ak	al	am	an	ap	eo
11	12	13	14	15	16	17	18	19	20
eb	ed	ef	eg	ek	el	em	en	ep	io
21	22	23	24	25	26	27	28	29	30
ib	id	if	ig	ik	il	im	in	ip	do
31	32	33	34	35	36	37	38	39	40
ob	od	of	og	ok	ol	om	on	op	uo
41	42	43	44	45	46	47	48	49	50
ub	ud	uf	ug	uk	ul	um	un	up	*a*o
51	52	53	54	55	56	57	58	59	60
*a*b	*a*d	*a*f	*a*g	*a*k	*a*l	*a*m	*a*n	*a*p	mio
61	62	63	64	65	66	67	68	69	70
mib	mid	mif	mig	mik	mil	mim	min	mip	nio
71	72	73	74	75	76	77	78	79	80

nib	nid	nif	nig	nik	nil	nim	nin	nip	pio
81	82	83	84	85	86	87	88	89	90
pib	pid	pif	pig	pik	pil	pim	pin	pip	biko
91	92	93	94	95	96	97	98	99	100

THE POWER OF THE CENTECIMAL KO.

biko	diko	fiko	giko	kiko	liko	miko	niko	piko	ako
100	200	300	400	500	600	700	800	900	1000
abko	adko	afko	agko	akko	alko	amko	anko	apko	eko
1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
ebko	edko	efko	egko	ekko	elko	emko	enko	epko	iko
2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
ibko	idko	ifko	igko	ikko	ilko	imko	inko	ipko	oko
3100	3200	3300	3400	3500	3600	3700	3800	3900	4000
obko	odko	ofko	ogko	okko	olko	omko	onko	opko	uko
4100	4200	4300	4400	4500	4600	4700	4800	4900	5000
ubko	udko	ufko	ugko	ukko	ulko	umko	unko	upko	*a*ko
5100	5200	5300	5400	5500	5600	5700	5800	5900	6000

*a*bko	*a*dko	*a*fko	*a*gko	*a*kko	*a*lko	*a*mko	*a*nko	*a*pko	moko
6100	6200	6300	6400	6500	6600	6700	6800	6900	7000
mobko	modko	mofko	mogko	mokko	molko	momko	monko	mopko	noko
7100	7200	7300	7400	7500	7600	7700	7800	7900	8000
nobko	nodko	nofko	nogko	nokko	nolko	nomko	nonko	nopko	poko
8100	8200	8300	8400	8500	8600	8700	8800	8900	9000
pobko	podko	pofko	pogko	pokko	polko	pomko	ponko	popko	bilo
9100	9200	9300	9400	9500	9600	9700	9800	9900	10000

ORDINAL.

bikoe	dikoe	fikoe	gikoe	kikoe	likoe	mikoe	nikoe	pikoe	akoe

THE POWER OF THE CENTECIMAL LO.

bilo	dilo	filo	gilo	kilo	lilo	milo	nilo	pilo	alo
10000	20000	30000	40000	50000	60000	70000	80000	90000	100000
ablo	adlo	aflo	aglo	aklo	allo	amlo	anlo	aplo	elo
110000	120000	130000	140000	150000	160000	170000	180000	190000	200000
eblo	edlo	eflo	eglo	eklo	ello	emlo	enlo	eplo	ilo
210000	220000	230000	240000	250000	260000	270000	280000	290000	300000

iblo	idlo	iflo	iglo	iklo	illo	imlo	inlo	iplo	olo
310000	320000	330000	340000	350000	360000	370000	380000	390000	400000
oblo	odlo	oflo	oglo	oklo	ollo	omlo	onlo	oplo	ulo
410000	420000	430000	440000	450000	460000	470000	480000	490000	500000
ublo	udlo	uflo	uglo	uklo	ullo	umlo	unlo	uplo	*a*lo
510000	520000	530000	540000	550000	560000	570000	580000	590000	600000
*a*blo	*a*dlo	*a*flo	*a*glo	*a*klo	*a*llo	*a*mlo	*a*nlo	*a*plo	molo
610000	620000	630000	640000	650000	660000	670000	680000	690000	700000
moblo	modlo	moflo	moglo	moklo	mollo	momlo	monlo	moplo	nolo
710000	720000	730000	740000	750000	760000	770000	780000	790000	800000
noblo	nodlo	noflo	noglo	noklo	nollo	nomlo	nonlo	noplo	polo
810000	820000	830000	840000	850000	860000	870000	880000	890000	900000
poblo	podlo	poflo	poglo	poklo	pollo	pomlo	ponlo	poplo	bimo
910000	920000	930000	940000	950000	960000	970000	980000	990000	1000000

ORDINAL.

biloe	diloe	filoe	giloe	kiloe	liloe	miloe	niloe	piloe	bimoe

AN E ADJOINED TO A CARDINAL MAKES IT ORDINAL.

bie	die	fie	gie	kie	lie	mie	nie	pie	aoe
1st	2d	3d	4th	5th	6th	7th	8th	9th	10th
abe	ade	afe	age	ake	ale	ame	ane	ape	eoe
11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
ebe	ede	efe	ege	eke	ele	eme	ene	epe	ioe
21st	22d	23d	24th	25th	26th	27th	28th	29th	30th
ibe	ide	ife	ige	ike	ile	ime	ine	ipe	doe
31st	32d	33d	34th	35th	36th	37th	38th	39th	40th
obe	ode	ofe	oge	oke	ole	ome	one	ope	uoe
41st	42d	43d	44th	45th	46th	47th	48th	49th	50th
ube	ude	ufe	uge	uke	ule	ume	une	upe	*a*oe
51st	52d	53d	54th	55th	56th	57th	58th	59th	60th
*a*be	*a*de	*a*fe	*a*ge	*a*ke	*a*le	*a*me	*a*ne	*a*pe	mie
61st	62d	63d	64th	65th	66th	67th	68th	69th	70th
mibe	mide	mife	mige	mike	mile	mime	mine	mipe	nie
71st	72d	73d	74th	75th	76th	77th	78th	79th	80th

nibe	nide	nife	nige	nike	nile	nime	nine	nipe	pie
81st	82d	83d	84th	85th	86th	87th	88th	89th	90th
pibe	pide	pife	pige	pike	pile	pime	pine	pipe	bikoe
91st	92d	93d	94th	95th	96th	97th	98th	99th	100th

CHARACTERISTICS.

There are many characteristics that show how wonderfully the literal alphabet gives aid to the Cho system: as though it was formed in anticipation of the coming of the other.

b and d for 1 and 2
f " g " 3 " 4
k " l " 5 " 6
m " n " 7 " 8
p " o " 9 " 10

b, f, k, m, p, for odd numbers, and
d, g, l, n, o, for even numbers.

The a, e, i, o, u, and *a*, are tens with mio, nio, and pio. .

a for one ten
e " two tens
i " three tens
o " four tens
u " five tens
a " six tens
mi " seven tens
ni " eight tens
pi " nine tens

PARENTHESES.

Before advancing to a higher step in our journey it is necessary to clear mathematics, and here, especially, arithmetic, of the confusing and wholly unexplained use of the parenthesis.

Generally the novice's eyes are blinded by brackets confusing numbers in enclosures without explanation, and in fact without, as yet, clearly defined laws for the use of the several kinds of these brackets.

The first parenthesis to be used for enclosing numbers, is the simple ( ), and is named bua.

Thus:

$$2 + 3 \times 4 - 1 = 13.$$

di pu fi su gi ru bi ke af.

$$(2 + 3) \times 4 - 1 = 19.$$

di pu fi bua su gi ru bi ke ap.

The bua asserts that the several units within it are to be taken as a one unit.

In a solution this is the first parenthesis to be dissolved.

The second parenthesis is [ ].

Thus: $[10 - (2 - 3)] \times 4 - 1$, and is named bue.

The third is bui, { } thus:

$$\{5 \times 7 + [10 - (2 - 3)]\} \times 4 - 1.$$

The fourth is buo, $<$ $>$ thus:

$$< 6 \div 3 + \; > 5 \times 7 + [10 - (2 - 3)] \} \times 4 - 1.$$

It is wholly undesirable at the present to go farther than bua ( ). When the other parentheses can be serviceable they will be explained.

With regard to placing of numbers within a parenthesis it must be always remembered that the plus, or pu, sign, +, must be changed to minus, —, and the minus to plus, before the negative sign —.

$$-2 + 3 \times 4 - 1 \qquad -2 - 3 \times 4 - 1$$
$$-(2 - 3) \times 4 - 1 \qquad -(2 + 3) \times 4 - 1$$

PUUM.

ADDITION.

The first stepping stone of arithmetic is called addition.

Study it thoroughly.

Learn all that can be learned regarding it.

Do not consider it lightly.

Your success in higher mathematics depends largely on your clear comprehension of this guide that stands at the door; modest, but exceedingly useful.

Addition has one characteristic that distinguishes it from every other mathematical element. It has a sum.

What is a sum?

It is the result obtained from adding one thing to other things.

The highest use of addition is to obtain this sum.

It is necessary that one shall clearly comprehend the various signs used instead of words to express mathematically the process of obtaining this sum.

The sign + called generally plus, meaning that one number is added to another to obtain the sum. This sign is called in the Cho language, pu.

Here, to aid in giving illustrations of this pu sign, another very important sign must be defined.

It is the sign of equality, or equal to. = mean-

ing that one number pu, or plus, added to another, equal a certain sum. The name given by Cho for this sign is, ke.

1	+	1	=	2	144	+	89	=	233
bi	pu	bi	ke	di	bi-og	pu	nip	ke	di-if
2	+	3	=	5	233	+	144	=	397
di	pu	fi	ke	ki	di-if	pu	bi-og	ke	fi-pim
5	+	3	=	8	397	+	233	=	630
ki	pu	fi	ke	ni	fi-pim	pu	di-if	ke	li-io
8	+	5	=	13	630	+	397	=	1,027
ni	pu	ki	ke	af	li-io	pu	fi-pim	ke	ao-em
13	+	8	=	21	1,027	+	630	=	1,657
af	pu	ni	ke	eb	ao-em	pu	li-io	ke	al-um
21	+	13	=	34	1,657	+	1,027	=	2,684
eb	pu	af	ke	ig	al-um	pu	ao-em	ke	el-nig
34	+	21	=	55	2,684	+	1,657	=	4,331
ig	pu	eb	ke	uk	el-nig	pu	al-um	ke	of-ib
55	+	34	=	89	4,331	+	2,684	=	7,015
ug	pu	ig	ke	nip	of-ib	pu	el-nig	ke	mio-ak
89	+	55	=	144	7,015	+	4,331	=	11,346
nip	pu	uk	ke	bi-og	mio-ak	pu	of-ib	ke	bi-af-ol

11,346 + 7,015 = 18,361
bi-af-ol pu mio-ak ke bi-nif-ab

Addition can be made in columns when units, tens and hundreds, etc., are placed in their respective order.

1	bi	2	di	5	ki	8	ni
1	bi	3	fi	3	fi	5	ki
—	—	—	—	—	—	—	—
2	di	5	ki	8	ni	13	af
13	af	21	eb	34	ig	55	uk
8	ni	13	af	21	eb	34	ig
—	—	—	—	—	—	—	—
21	eb	34	ig	55	uk	89	nip

89	nip	178	bi-min	422	gi-ed
55	uk	89	nip	928	pi-en
34	ig	55	ig	347	fi-om
				562	ki-*ad*
178	bi-min	422	gi-ed		
				2259	ed-up

By far the best method for adding large and intricate columns of figures that may be subjected to legal proceedings are by units and tens. The figures, orderly arranged, should be divided into columns of units and tens, through ruling, or mentally. The units column should first be added and the tens carried over to the tens column: then the sum of these two should be written beneath these two columns.

The same process is to be continued as though each were units and tens. Finally these several sums are to be added.

No student should presume to continue the farther study of arithmetic until the method of adding with positive proofs of accuracy of the sum are thoroughly mastered. Surely no one can become an able mathematician without facility in adding with certainty of correctness.

Often complicated mathematical problems will be vitiated by a slight mistake made in adding and occasionally the mistake made here will be equal to criminality. Therefore it is earnestly urged that each student shall thoroughly master the following and other examples.

Occasionally it is necessary that one shall be positive as to the accuracy of an addition.

In mathematics nothing can be properly left to supposition: each statement must bear positive proof of accuracy.

There are two methods only that should be legally accepted as to the proven correctness of the sums of figures; and in the handling of large public finances one of these two should always be made, namely: that of casting out the nines, or that of casting out the elevens. Since the nine method has a slight advantage in simplicity over the eleven only the nines need be given.

7th	6th	5th	4th	3d	2nd	1st
9	87	46	25	32	64	10
			64	25	39	02
		25	32	47	63	19
	1	23	45	67	89	10
					12	21
				19	14	31
			25	62	45	29
		9	31	47	36	28
	4	56	78	25	31	02
29	34	55	67	82	91	50
1	02	07	09	84	73	21
						12
					1	45
				6	27	82
			7	37	72	28

					3	90
				6	57	
			5	31		
		3	93			
	2	71				
1	28					
39						
40	30	74	98	37	60	90

CASTING OUT THE NINES.

Since simplicity is the highest achievement of ability the casting out nines should have the most careful attention of the student.

No figures of whole numbers should be admitted before courts of justice when large amounts are involved and where accuracy is a necessity without having been proven correct by the test of nines.

The casting out nines is applicable to any combination of whole numbers, addition, subtraction, multiplication or division.

Here we are considering only addition.

$$\begin{array}{r} 12345 \\ 67890 \\ 98765 \\ 43210 \\ \hline 210 \\ 220 \\ 20 \\ \hline 222210 \end{array}$$

$$\begin{array}{r} 2+1=3 \\ 210=3 \\ \hline 2+2=4 \\ 220=4 \\ \hline 2=2 \\ 20=2 \end{array}$$

$$3+4+2=9$$
$$222210=9$$

6th	5th	4th	3d	2d	1st	
9	87	62	34	47	29	1st
	67	82	95	14	21	$2 + 6 = 8$
		3	45	28	76	$548 = 8$
		1	23	45	67	2nd
					29	$5 + 5 = 1$
				1	35	$637 = 1$
				2	45 26	3d
				28	34 47	$7 + 8 = 6$
			8	76	52 32	$681 = 6$
	98	87	76	65	43	4th
10	12	14	16	17	18	$0 + 3 = 3$
1	23	45	67	89	10	$498 = 3$
		64	87	92	23	5th
	4	56	62	26	31	$8 + 4 = 3$
					12	$291 = 3$
				1	25	6th
			45	19	21	$1 + 1 = 2$
		76	25	92	03	$20 = 2$

					5	48
			6	86	67	
		4	98		1	
	2	91				
20						

$8 + 1 + 6 + 3 + 3 + 2 = 5$

---

22 96 04 87 72 48 = 5

RUUM.

SUBTRACTION.

The second guard at the outer door of the Temple of Wisdom, the companion of addition, is subtraction.

The one examines the novitiate as to his positive qualities, this, as to his negative principles: the one as important as the other.

The one adds, this subtracts.

He who wisely enters will carefully study these two guards and gain their permission to advance deeper into the wonderful science of numbers.

While addition has one characteristic, namely: the sum; subtraction has three inseparable qualities. It must have a minuend or a number that is to be lessened, or diminished, which Cho calls, rui; the number that lessens or diminishes, the subtrahend, or, called ru, and a difference or remainder, which is called ruo.

Thus:

1 2 3 4 5 minuend, or rui
1 2 3 4 subtrahend, or ru

---

1 1 1 1 1 the difference, or ruo.

The one characteristic sign of addition is +, plus, or pu; and the one characteristic sign of subtraction is — minus, or ru.

These two signs are so simple, so familiar and so useful that as no improvement therein is possible, they remain eternal.

Occasionally and especially in working through higher mathematics a mistake made in subtraction is as injurious as a mistake made in addition would be. Also in making laws for appropriation of public moneys care must be taken as to the absolute correctness of these two guards, addition and subtraction.

Legally the only proof of correctness should be the test of the wonderful nine.

If the nines of the subtrahend plus the nines of the difference are equal to the nines of the minuend all the three characteristics are correct.

Thus:

$$\begin{array}{r} 1\,2\,3\,4\,5 = 6 \\ \hline 1\,2\,3\,4 = 1 \\ \hline 1\,1\,1\,1\,1 = 5 + 1 = 6 \end{array}$$

This method of casting out the nines is much quicker, easier and more exact than the old obsolete direction for making a proof.

Each pupil is earnestly requested to practice by examples made by himself, under the guidance of this guard at the outer door before going farther.

SUUM.

MULTIPLICATION.

At the inner door of the Temple are two other guards: the name of one is multiplication, suum.

Suum has three characteristics, namely: the multiplicant, or sui, the multiplier, or su, and the product, or suo.

Sui and su are said to be factors of the product, suo, because they are considered as component parts of the product. The essential constituents of the sum, (puo); in addition, (puum); those of subtraction, (suum); and those of division, (tuum) are not called factors.

Factors are said to be the multipliers that produce a product.

The sign of multiplication, thus: $\times$ is called su, and tells that the multiplicant is multiplied by the multiplier.

The product is of a like unit with its multiplican and the multiplier must always be an abstract.

It is not proper to say five men times ten; but it

is, ten times five men: not ten multiplied by five men; but five men multiplied by ten. It is known that the ten refers to men, but the utterance of that fact is not correct.

It is a mistake to multiply by the powers of a factor of any number. It only adds confusion. 8 is one thing, and 2^3 is wholly a different mathematical element.

bi	di	fi	gi	ke	li	mi	ni	pi	ao
1	2	3	4	5	6	7	8	9	10
di	gi	li	ni	ao	ad	ag	al	an	eo
2	4	6	8	10	12	14	16	18	20
fi	li	pi	ad	ak	an	eb	eg	em	io
3	6	9	12	15	18	20	24	27	30
gi	ni	ad	al	eo	eg	en	id	il	do
4	8	12	16	20	24	28	32	36	40
ki	ao	ak	eo	ek	io	ik	do	ok	uo
5	10	15	20	25	30	35	40	45	50
li	ad	an	eg	io	il	od	on	ul	*a*o
6	12	18	24	30	36	42	48	56	60
mi	ag	eb	en	ik	od	op	ul	*a*g	mio
7	14	21	28	35	42	49	56	63	70
ni	al	eg	id	do	on	ul	*a*g	mid	nio
8	16	24	32	40	48	56	64	72	80
pi	an	em	il	ok	ug	*a*f	mid	nib	pio
9	18	27	36	45	54	63	72	81	90
ao	eo	io	do	uo	*a*o	mio	nio	pio	biko
10	20	30	40	50	60	70	80	90	100

7 8 6 5 7 3 4 = 4
1 2 3 4 5 6 7 = 1

---

5 5 0 6 0 1 3 8
4 7 1 9 4 4 0 4
3 9 3 3 8 6 7 0
3 1 4 6 2 9 3 6
2 3 5 9 7 2 0 2
1 5 7 3 1 4 6 8
7 8 6 5 7 3 4

---

7 8
1 7 1
3 6 1
3 7 3
2 0 4
1 6 9
8

---

9 7 1 0 7 7 6 6 2 7 1 7 8 = 5

Every product of importance, that is to say, of numbers liable to appear in a court of justice should be subjected to the proof of the nines.

One peculiarity of the nines, never before the present especially pointed out, is the very evident fact that proof by nines when either factor is less than nine is unserviceable. Thus: $6 \times 6 = 36$, li su li ke il. The nines of the factors equal 3:

while those of the product equal 0. When each of the factors is more than nine we get the proper result from the proof.

Thus:

```
                    36 = 9 = 0
                    36 = 9 = 0
                   ----
                   216 = 9 = 0
                  108  = 9 = 0
                  ----
                  1296 = 9 = 0
                  1296 = 9 = 0
                  ----
                  7776 = 9 = 0
                 11664 = 9 = 0
                  2592 = 9 = 0
                 1296  = 9 = 0
                 ------
                 1679616 = 9 = 0
                 1679616
                 -------
               10065696
               1679616
             10065696
           15115544
         11757312
       10065696
       1679616
-----------------
2720407695456 = 3
```

Here an error exists. Where is it?

The author of Cho Momo does not deem it necessary to fill space (a defect of so many arithmetics) with silly, useless additions, subtractions, multiplications and divisions that any student can readily make at any time; but it is earnestly requested that every seeker of knowledge and ability will drill thoroughly in the art of the four fundamentals of mathematics.

CONTRACTIONS OF MULTIPLICATION.

It must be remembered that the shortest road is not always the safest road.

Mathematics have many more higher functions than is usually supposed. They are not given simply for attaining an end easily, but are given as the one true method of producing firmness, stability, health and purity in the bony structure of the human system.

The athlete may train as he is ordered, diet according to rule, but most surely if he has not a knowledge of mathematics in his head his bones will not endure severe trial. A gentleman of culture has the advantage over brute strength every time. Bread is good, but we live not by bread alone. He who seeks the shortest cut across is often the last one home.

Contractions in multiplications will be learned as the exigencies of the case demand: They are not worthy of especial study at this time.

First learn to multiply accurately, learn patiently, learn thoroughly. Every hard effort made now clears future problems immeasurably.

Most of the arithmetics at present existing give in the study of multiplication powers and exponents of numbers as multipliers. This is another error of the many thousands committed. Powers and exponents belong to the properties of numbers. To ask the student to jump from the ground to the pinnacle of the Temple without a ladder is to ask an impossibility.

TUUM.

DIVISION.

Division like a beautiful goddess worthy of adoration, this companion of multiplication stands firmly established at the inner door of the Temple inviting approach.

Addition, subtraction and multiplication have allowed us to pass this far. Will she smilingly give permission to enter farther?

Cho's name for division is tuum. Thus we have now, addition or puum, subtraction, ruum, multiplication or suum and division or tuum.

Tuum has four characteristics. First the dividend or the unit that is to be divided, called by Cho, tui; second, the divisor or tu; third, the quotient or tuo and tua the remainder, in case such exists.

A certain restriction pertains to its acts, namely: that only similars or like units can be divided by similars or likes.

The sign of division ÷ called tu is simplicity itself.

As a matter of convenience division is divided into short and long division.

Short division applies to all numbers where the divisor is one of the prime units, namely: 2, 3, 4, 5, 6, 7, 8, 9.

It is an error to say that a unit is divided by 1 or itself. 1 or unity does not divide anything. It, like Deity, does not have to destroy, nor change

itself or another. As it was in the beginning perfect, so at the end, and so also along all the path between the beginning and the end perfection rules unchanged.

A unit does not divide itself. Its action on itself proves mathematically that the only power in the universe capable of annihilating is one's self. One or Deity will not do it, another unit divides, or multiplies its powers; but itself alone can destroy.

```
6645)8 9 8 7 9 2 0 3 3 5 4 2 3 3 5 (1323105123
       6 6 4 5
     ---------
     2 1 4 7 0
     1 9 9 3 5
     ---------
       1 5 3 5 3
       1 3 2 9 0
       ---------
         2 0 6 3 3
         1 9 9 3 5
         ---------
             6 9 8 5
             6 6 4 5
             -------
               3 4 0 4 2
               3 3 2 2 5
               ---------
                   8 1 7 3
                   6 6 4 5
                   -------
                   1 5 2 8 3
                   1 3 2 9 0
                   ---------
                     1 9 9 3 5
                     1 9 9 3 5
                     ---------
```

The constituents that makes the product in multiplication are called factors, or sua. Those that give the sum in addition are magnets or pua, and the dividend and the divisor that form the quotient are electrics or tua. The minuend and subtrahend are non-magnets rua.

It will be observed that division engages multiplication and subtraction in every step of its operation.

The electric 6645, in the above example, becomes, through the act of the factor 1, a factor in the product 6645; then it becomes a non-magnet subtracting its power from the main electric.

Again the electric 6645 becomes, through the act of the factor 3, a factor in the product 21470, when it forms a non-magnet, subtracting the power of 21470 from the main electric.

Finally, 6645 and 1323105123 are factors capable of producing 8792033542335.

In division one very important fact, not previously observed by any mathematician, is that when a trial number is placed in the quotient for multiplying the divisor to obtain the product that is to be subtracted from the dividend it is not the trial number in the quotient that should be used to multiply the divisor but it is the given divisor that should multiply the trial number. This may seem a trifling matter to inexperienced mathematicians. It is actually an important essential in many intricate problems. It is immaterial in most problems as to

whether the divisor is the multiplican or the multiplier, but it is of serious import in higher mathematics.

Ten or any multiple of ten makes the units figure of its main electric a portion of ten, thus: 1234 divided by a sub-electric 10 becomes $123\frac{4}{10}$ preferably expressed by a period, which will be explained later, thus: 123.4

100 makes the tens and units figures of the main electric a portion of 100, thus: 12.34

Then it is evident that 10, or a multiple of 10, divides off the main electric as many figures as there are ciphers in the sub-electric.

An equivalent, ike, is the $\frac{1}{10}$, the $\frac{1}{100}$, or the $\frac{1}{1000}$ of any number.

1	is	the	ike	of	10;	100,	1000,	etc.
2	"	"	"	"	20,	200,	2000,	"
3	"	"	"	"	30,	300,	3000,	"
4	"	"	"	"	40,	400,	4000,	"
5	"	"	"	"	50,	500,	5000,	"
67	"	"	"	"		670,	6700,	"
89	"	"	"	"		890,	8900,	"

DIVISORS.

The Common Divisor.

The Greatest Divisor.

The Greatest Common Divisor.

All the possible factors of any number are divisors of that number.

Prime numbers are not made of factors and have no divisors. When arithmeticians say that a prime can be divided by 1 or itself we hold they err. One and the number itself are not included as divisors of a given number.

A common divisor of two or more numbers is the number that will divide each.

The greatest divisor is one that will divide each and be the highest divisor of the lowest of the given numbers.

The greatest common divisor (g. c. d.) is the highest divisor common to all the given numbers.

Prime numbers have no divisors.

The first product of primes have only one divisor, as 25 has only 5. 49, only 7. 121, has only 11.

The second product of primes has but two divisors, as: 14641 has only 121 and 11.

The product of primes and composites has as many divisors as there are multiples of the primes plus the several factors of the composites.

The highest divisor of any number is its one half.
The second highest its one third.
" third " " " fourth.
" fourth " " " fifth, etc.

Many problems of higher mathematics depend on the accuracy of divisors and especially of the g. c. d. It is the province of arithmetic to provide methods for obtaining these several divisors.

It is profitable to examine the divisors of all numbers from 1 to 100, since all other numbers are multiples of these.

From 1 to 100 inclusive the following are primes,

1	11		31	41		61	71	
3	13			43	53		73	83
5								
7	17		37	47		67		97
		29			59		79	89

and hence have no divisor.

The following formed by the multiple of a prime by itself has but one divisor.

2 has 1, 9 has 3, 25 has 5, 49, 7, 81, 9.

It is observed that all primes end in 1, 3, 7 or 9 and that prime numbers of whatever magnitude, 5 excepted, end in 1, 3, 7, or 9.

To illustrate:

1	3	5	7	19
11	13		17	29
31	43		37	59
41	53		47	79
61	78		67	89
71	83		97	

The common divisor of two or more numbers is any number that will divide each of the given numbers.

The greatest common divisor is the largest divisor of the smallest of any two or more given numbers that will divide the other given numbers. In case the smallest number is itself a divisor of the other number it is the g. c. d.

Thus: 8)8, 32, 64

4 8

8 is the g. c. d.

In 8, 12, 16; since 8 will not divide 12, one half of 8 or 4 is the g. c. d.

4)8, 12, 16

2 3 4

It follows then that the highest fractional part of the lowest given number, if this number is not itself the common divisor, is the g. c. d. of all the given numbers.

Occasionally it occurs that the smallest of the given numbers is a prime number having no fractional parts. If this prime cannot be used as the common divisor of the other numbers, there is no common divisor of those numbers.

Occasionally one of the larger numbers is a prime in which case there is no common divisor.

We are now prepared to make acquisitions.

Common divisors of a number are necessary in

the ordinary affairs of life and in the solution of many mathematical problems.

Remember that always all the possible factors of any number are divisors of that number.

The first of the whole numbers that has factors and divisors is 2.

$1 \times 1 = 2$
$2 \div 1 = 1$

Then 4

$2 \times 2 = 4$
$4 \div 2 = 2$

6

$2 \times 3 = 6$
$6 \div 2 = 3$

8

$2 \times 4 = 8$
$8 \div 2 = 4$

9

$3 \times 3 = 9$
$9 \div 3 = 3$

10

$5 \times 2 = 10$
$10 \div 2 = 5$

With the number 12 we enter an increase of factors and divisors. 12 has more than 2 and 6, hence we have to look deeper.

The greatest divisor of any number is its one half,

$$2)12,\ 6,\ 3$$

$$3)\ 4\ \ 2$$

6 as the greatest divisor of 12, and 6, 4, 3, 2 are all its possible divisors.

When expression is given to all the divisors of any number the expression should be with decreasing ratio, thus: 6, 4, 3, 2 rather than with increasing ratio, as: 2, 3, 4, 6.

To know the different divisors of a number, the common divisors of several numbers and especially the greatest common divisor is a matter of extreme importance in many problems.

What are the divisors of 24?

2)24, 12, 6, 3
3) 8, 4
4) 6, 3

Ans. 12, 8, 6, 4, 3, 2

What of 68?

2)68, 39

Ans. 39, 2

What of 64?

2)64, 32, 16, 8, 4, 2
4) 16, 8, 4, 2
8) 8, 4

Ans. 32, 16, 8, 4, 2 = 5

Of 60?

2)60, 30, 15
3) 20, 10
4)15
5) 12, 10, 3
6)10, 5

Ans. 30, 20, 15, 12, 10, 5, 4, 3, 2 = 9

Now compare the above clear, concise and simple method with the following long and complicated way advised by so-called standard arithmetics.

"The Greatest Common Divisor or Measure.

"The greatest common divisor or measure of two or more numbers is the greatest number that will divide each of them without a remainder. Thus, 4 is the greatest common divisor of 8, 12, and 16.

To find the greatest common divisor of two or more numbers.

Ex. 1. Required the greatest common divisor or measure of 24 and 88. Ans. 8.

FIRST OPERATION.

$24 = 2 \times 2 \times 2 \times 3$
$88 = 2 \times 2 \times 2 \times 11$.
$2 \times 2 \times 2 = 8$. Ans.

Resolving the numbers into their prime factors, thus, $24 = 2 \times 2 \times 2 \times 3$, and $88 = 2 \times 2 \times 2 \times 11 = 88$, we find the factors $2 \times 2 \times 2$ are common to both. Since only these common factors, or the product of two or more of such factors, will exactly divide both numbers, it follows that *the product of all their common prime factors must be the greatest factor that will exactly divide both of them.* Therefore, $2 \times 2 \times 2 = 8$, the greatest common divisor required.

The same result may be obtained by a sort of trial process, as by the second operation.

SECOND OPERATION

```
24 ) 88 ( 3
     72
    ---
     16 ) 24 ( 1
          16
         ---
           8 ) 16 ( 2
               16
              ---
```

It is evident, since 24 cannot be exactly divided by a number greater than itself, if it will also exactly divide 88, it will be the *greatest common divisor* sought. But, on trial, we find 24 will not exactly divide 88, there being a remainder, 16. Therefore 24 is not a common divisor of the two numbers.

We know that a common divisor of 16 and 24 will, also, be a common divisor of 88 (Art. 197). We next try to find that divisor. It cannot be greater than 16. But 16 will not exactly divide 24 there being a remainder 8; therefore 16 is not the greatest common divisor.

As before, the common divisor of 8 and 16 will be the common divisor of 24 and 88 (Art. 197); we make trial to find that divisor, knowing that it cannot be greater than 8, and find 8 will exactly divide 16. Therefore 8 is the greatest common divisor required.

THIRD OPERATION.

```
24 ) 88 ( 3
     72
    ---
     16
      8 ) 24 ( 3
          24
         ---
```

The last method may be often contracted, if there should be observed to be any prime factor in a remainder which is not common to the preceding divisor, by canceling said factor. Thus, in the third operation, the factor 2 being found in the remainder 16 once more than in the divisor 24, we cancel one 2 from 16, and, having left the composite factor 8, we divide 24 by that factor. There being no remainder, 8 is the greatest common divisor, as before obtained."

In consideration of the inevitable fact that within sixty days after the publication of Cho Momo every other arithmetic will be useless and so much waste paper the following is copied, by word and by letter, to show how not to do it.

"LEAST COMMON MULTIPLE.

"A *common mutiple* of two or more numbers is a number that can be divided by each of them without a remainder; thus, 14 is a common multiple of 2 and 7.

The *least common multiple* of two or more numbers is the *least* number that can be divided by each of them without a remainder; thus, 12 is the least common multiple of 4 and 6.

"A *multiple* of a number contains all the prime factors of that number; the *common multiple* of two or more numbers contains all the prime factors of each of the numbers; and the *least common multiple* of two or more numbers contains only each prime factor taken the greatest number of times it is found in any of the several numbers. Hence,

1. The least common multiple of two or more numbers must be the *least* number that will contain all the prime factors of them, and none others.

2. The least common multiple of two or more numbers, which are prime to each other, must equal their product.

3. The least common multiple of two or more numbers must equal the product of their greatest common divisor, by the factors of each number not common to all the numbers.

4. The least common multiple of two or more numbers, divided by any one of them, must equal the product of those factors of the others not common to the divisor.

"To find the least common multiple of two or more numbers.

Ex. 1. What is the least common multiple of 8, 16, 24, 32, 44?

Ans. 1056.

FIRST OPERATION.

$8 = 2 \times 2 \times 2$
$16 = 2 \times 2 \times 2 \times 2$
$24 = 2 \times 2 \times 2 \times 3$
$32 = 2 \times 2 \times 2 \times 2 \times 2$
$44 = 2 \times 2 \times 11$
$2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 11 = 1056$ Ans.

Resolving the numbers into their prime factors, we find their different prime factors to be 2, 3, and 11. The greatest number of times the 2 occurs as a factor in any of the given numbers is 5 times; the greatest number of times 3 occurs in any of the numbers is once; and the greatest number of times the 11 occurs in any of the numbers is once. Hence 2, 2, 2, 2, 2, 3, and 11 must be all the prime factors necessary

in composing 8, 16, 24, 32, and 44; and consequently, 1056, the product of these factors, is the least common multiple required (Art. 202).

SECOND OPERATION.

2) 8 16 24 32 44

2) 4 8 12 16 22

2) 2 4 6 8 11

2) 1 2 3 4 11

1 1 3 2 11

2×2×2×2×2×3×11 = 1056 Ans.

Having arranged the numbers on a horizontal line, we divide by 2, a prime number that will divide two or more of them without a remainder, and write the quotients in a line below; and we continue to divide by a prime number as before, till the divisor and remainders are all prime to each other. Then, these, since they include all the factors necessary to form the given numbers and no others, we multiply together for the required least common multiple, and obtain 1056, as before.

The least common multiple of two or more numbers may be found generally by a process much shorter than either of the above methods by canceling any number that is a factor of any other of the given numbers, and also by dividing the numbers by such a composite number, as may be observed to be their common or greatest common divisor.

THIRD OPERATION.

4) ~~8~~ ~~16~~ 24 32 44

2) 6 8 11

3 4 11

4×2×3×4×11 = 1056 Ans.

Thus, in the third operation, 8 being a factor of several of the numbers, and 16 being a factor of one other number, we cancel them; and observing that 4 is the greatest common divisor of the remaining numbers, we divide them by it. We next divide by 2, as in the second operation. The numbers in the lower line then being prime to each other, we multiply them and the divisors together, and obtain 1056 as the least common multiple.

FOURTH OPERATION.

~~8~~ ~~16~~ 24 | 32 44

4 11

24×4×11 = 1056 Ans.

The fourth operation exhibits a process yet more contracted. The 8 and 16 being factors each of one or more of the other numbers, we cancel them, as in the third operation. Of the remaining numbers we cut off 24 by a short vertical line from the rest as a factor of the least common multiple sought. We then strike out of the two remaining numbers the largest factor each has in common with the 24, by dividing each of them by the greatest common divisor between it and 24, and write the result beneath. The numbers in the lower line having no factor in common, we carry the process no further. The continued product of the number cut off by the numbers in the lower line gives 1056, the least common multiple, as by the other methods. In this instance we cut off the 24, but either the 32 could have been separated from the rest, or the 44 cut off, and the needless factors striken out with like

result. If, however, we had cut off the 44, the numbers placed in the second line would have contained factors common to each other, so that it would have been necessary in that line to have cut off and stricken out factors as before. The reason for this abridged process is, that by the separating off, and by the striking out of factors, we get rid, in an expeditious way, of the factors not required to form the least common multiple sought.

"RULE 1.—*Resolve the given numbers into their prime factors. The product of these factors, taking each factor only the greatest number of times it occurs in any of the numbers, will be the least common multiple.*

Or,

"RULE 2.—*Having arranged the numbers on a horizontal line, cancel such of them as are factors of any of the others, and separate some convenient one from the rest. Reject from each of the numbers remaining the greatest factor common to it and that number, and write the result in a line below. Should there be in the second line numbers having factors in common, proceed as before; and so continue until the numbers written below are prime to each other. The continued product of the number or numbers separated from the others with those in the last line will be the least common multiple.*

"NOTE 1.—Some give a preference to the following rule for finding the least common multiple: *Having arranged the numbers on a horizontal line, divide by such a prime number as will exactly divide two or more of them, and write the quotients and undivided numbers in a line beneath. So continue to divide until the quotients shall be prime to each other. Then the product of the divisors and the numbers of the last line will be the least common multiple.*

"NOTE 2.—The least common multitple of two or more numbers that are prime to each other is found by multiplying them together (Art. 202).

"NOTE 3.—When a single number alone is prime to all the rest, it may be separated off, and used only as a factor of the least common multiple sought.

"NOTE 4.—When the least common multiple of several numbers, and all the numbers except one, which is prime to the others, are given, to find the unknown number, divide the least common multiple given by that of the known numbers (Art. 202)."

After showing how *not* to find common divisors and the greatest common divisor, we present the one right way.

What are the common divisors of 45 and 135?

Take 45 as the smaller of the two numbers.

Its lowest is 3, and 3 divides 45 into 15, its high-

est divisor; hence all the common divisors lie between 3 and 15.

$$\begin{array}{r} 3)135 \\ \hline 5)\ 45 \\ \hline 9 \end{array}$$

show that all the common divisors possible to 45 and 135 are 9, 5, 3.

What are the common divisors of 51, 153, 255? Since 51 is a common divisor of 153 and 255 it is the g. c. d.

The least number that will divide 51 is 3, and 3 divides 153, 51, and 255. The only divisors of 51 are 17 and 3 and the only common divisors of 51, 153, 255 are 51, 17, 3.

What are the common divisors of 180 and 360?

180 exactly divides 360, hence it is the g. c. d. 180 is divided by 2, hence 2 is the least common divisor. All the divisors common to 180 and 360 must lie within 180 and 2,

$$\begin{array}{r} 2)180,\ 90,\ 45 \\ 3)\ 60,\ 30,\ 15 \\ 4)\ 45 \\ 5)\ 36 \\ 6)\ 30,\ 15 \\ 9)\ 20,\ 10,\ 5 \\ 10)\ 18,\ 9 \\ 12)\ 15, \end{array}$$

hence all the common divisors of 180 and 360 are 180, 90, 60, 45, 36, 30, 20, 18, 15, 12, 10, 9, 6, 5, 4, 3, 2.

How many common divisors have 2025, 6075, 8100?

Since the other numbers are divided by 2025 this is the g. c. d. The lowest number that divides 2025 is 3, hence this is the least common divisor. (l. c. d.) All the divisors common to these three numbers must lie within 2025 and 3.

3)2025, 675, 225, 75, 25
5) 405, 135, 45, 15, 5
5) 81, 27, 9, 3
9) 9, 3

2025, 675, 405, 225, 135, 81, 75, 45, 27, 25, 15, 9, 5, 3 = 14.

How many common divisors have 4500 and 9000?

Since 4500 is an exact divisor of 9000 it is the g. c. d., and since it is divided by 2, this is the l. c. d., hence all the divisors common to 4500 and 9000 must fall within 4500 and 2.

2	3	4	5	6	9
4500	1500	..	900	750	500
2250	....	..	450	375	250
1125	....				125

(3)	(5)	(9)
300	180	20
150	90	10
100	60	5
75	45	4
50	36	2
25	18	
	9	

4500	300	60	12
2250	250	50	10
1500	225	45	9
1125	180	36	6
900	150	30	5
750	125	25	4
500	100	20	3
450	90	18	2 = 35
375	75	15	

MULTIPLES.

The Least Multiple.

The Least Common Multiple.

How many people in this enlightened age know what a multiple is?

How many know what a least multiple is?

Do you?

No.

How many know what a least common multiple is?

No one!

Yet arithmetics are full of it.

A multiple is the product produced by multiplying two or more factors.

Thus: 3×5 give the product, or multiple, 15. $2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9$ produce the multiple, or product, 362880. There is nothing great nor less about the 15, or the 362880 and surely there is nothing common in them. They are the only product those numbers are capable of producing.

In arithmetic and in higher mathematics there is frequently need of a number that several given numbers can exactly divide. A certain way has

been discovered (how, when or through whom no one knows) that readily supplies this need.

Fifteen is the only result possible from multiplying 3×5, and 362880 is the only number that can be produced by multiplying the several above given numbers. It is a law that the element that is essential in forming any objective can by its removal dissolve the thing previously formed. Hence the number 362880 can be divided and destroyed by any or all, of the above named factors used as divisors.

The requirement is not a multiple, as is 362880, or 15 but the only one number, regardless whether it is lesser or greater, that the above different numbers can exactly divide. There is no other than a certain one number in existence; then why qualify it by the adjective, "least."

What is the only one right way, previously discovered, for finding this one much desired number?

A law, which Cho Momo takes the credit for expressing in words, is that: the product of the divisors and the primes of several given numbers is the one number that each of the given numbers will exactly divide.

Thus, in $3)15$ the divisor is 3, the prime is 5.

5

The product of these is 15, hence 15 is the only one number 3 and 5 will exactly divide.

Take

2)2, 3, 4, 5, 6, 7, 8, 9

3) 3 2 5 3 7 4 9

2) 2 5 7 4 3

5 7 2 3

2, 3 and 2 are divisors of the given numbers and since 5, 7, 2, 3 cannot be farther reduced they are the primes.

$2 \times 3 \times 2 \times 5 \times 7 \times 2 \times 3 = 2520$. Hence 2520 is the only one number the given numbers will exactly divide

2520	divided	by	2	1260
"	"	"	3	840
"	"	"	4	630
"	"	"	5	504
"	"	"	6	420
"	"	"	7	360
"	"	"	8	315
"	"	"	9	280

One high authority has the following nonsense. "The multiples that two or more numbers have in common are called Common Multiples, and the least of these, is called their *Least Common Multiple,* (sic) which is indicated by L. C. M." (sic)

Is the blunder of the words driven any deeper by capitalizing the words "least common multiple?"

Two or more numbers never have multiples (plural). They do have a multiple or product, which is not common but is fixed and unchangeable. In 3×5 the 15 are not multiples but is a multiple or product.

Can any pupil understand the ambiguous and ungrammatical language of the above quoted authority?

362880 is the multiple of the given numbers and 2520 is the product of wholly different numbers: the one having nothing in common with the other.

PROPERTIES OR CHARACTERISTICS OF NUMBERS.

The prime units as previously stated are ten. namely: O, 0; 1, bi; 2, di; 3, fi; 4, gi; 5, ki; 6, li; 7, mi; 8, ni and 9, pi.

These ten are called digits after the number of fingers on the two hands, whence enumeration came.

And let it be written here that originally humanity made calculations unerringly and unconsciously by instinct, as birds build their nest and bees their hive, wisely and well. It was only after expulsion from the garden of Eden that stupidity, through Adam's attempt to run an independent government without Divine guidance, began and shows its culmination in the horrible production of the twentieth century arithmetic, which today, like all else, is passing through a final judgment.

The digits began originally with the thumb of the left hand, which is O: the left index finger is 1: the long finger, 2: the ring finger is 3: the left little finger is 4: and the little finger of the right hand is 5: its companion is 6: the right long finger is 7: the right index is 8 and the right thumb is 9.

A units digit is the single figure standing in the units place, thus, 9: the tens digit is the one, as 8, standing at the tens place, thus, 89: the hundreds

digit is the one standing at the hundreds place, thus, 7 in 789.

As the stars in the heavens, the thousands of planets, the sun and the moon attest the operation of a Divine hand governing and controlling all things so these ten apparently insignificant figures have symbolism and uses that stamp them as coin coming from God's laboratory.

As this earthly planet is built upon and has at its center an ever-enlarging vacuum that eternally holds it in place and existence so the ten digits begin with an O, a vacuum, or, as it were, a nothing.

As the vacuum is the most powerful of conceivable creations; as it is the only one thing that can exist on nothing and since it exists alone and without it none else can exist; and as it is more important than the nucleus or the protoplasm and finally as it is the only conceivable creation capable of being at the center, where alone quietude absolutely exists, and hence as it is the abiding place of Deity it is represented in numbers by the zero mark.

As this little round figure that standing alone is without value it, and like Deity, seeks to give all itself to the environment so that all other than itself is one; all else in numbers come from 0 and 1.

This one is the one, the only one and sole manifestation of its Creator. It is unchangeable, indivisible, the same yesterday, to-day and forever. It can part itself into infinitude and multiply itself into eternity.

The number 2 is 2 ones
" " 3 " 3 "
" " 4 " 4 "
" " 5 " 5 "
" " 6 " 6 "
" " 7 " 7 "
" " 8 " 8 "
" " 9 " 9 "

$$1 = 1. \quad \frac{2}{2} = 1. \quad \frac{3}{3} = 1. \quad \frac{4}{4} = 1.$$

$$\frac{5}{5} = 1. \quad \frac{6}{6} = 1. \quad \frac{7}{7} = 1.$$

$$\frac{8}{8} = 1. \quad \frac{9}{9} = 1.$$

One-half is a part of 1, but not of the One: it is ½ of the 2's 1.

⅓ is one third of the 3's 1. 1/6 is one sixth of the 6's 1

¼ is one fourth of the 4's 1. 1/7 is one seventh of the 7's 1.

1/5 is one fifth of the 5's 1. 1/8 is one eighth of the 8's 1

1/9 is one ninth of the 9's 1.

Composite units are combinations of the ten primes.

The numbers 0, 2, 4, 6 and 8 are, as it were, and for special, as yet, unrevealed reasons, feminine numbers and 1, 3, 5, 7 and 9 are masculine numbers.

Each prime unit contains a symbolism that carries it into the world of the imponderable elements.

0 is Divinity
1 " unity
2 " union
3 " trinity
4 " fortitude
5 " ability
6 " endurance
7 " retrospection
8 " providence
9 " perfection.

The following is interesting and profitable

1 3 = 3 × 3 = 9 = 1 9 = 9
2 3's = 6 × 3 = 18 = 2 9's = 18
3 3's = 9 × 3 = 27 = 3 9's = 27
4 3's = 12 × 3 = 36 = 4 9's = 36
5 3's = 15 × 3 = 45 = 5 9's = 45
6 3's = 18 × 3 = 54 = 6 9's = 54
7 3's = 21 × 3 = 63 = 7 9's = 63
8 3's = 24 × 3 = 72 = 8 9's = 72
9 3's = 27 × 3 = 81 = 9 9's = 81

9 = 9	90 = 9
18 = 9	81 = 9
27 = 9	72 = 9
36 = 9	63 = 9
45 = 9	54 = 9
72 = 9	27 = 9
81 = 9	18 = 9

09 = 9

The above put into Cho gives the following:

bi fi ke fi su fi ke pi ke bi pi ke pi
di fi ke li su fi ke bi. ni ke di pi ke bi ni
fi fi ke. pi su fi ke di mi ke fi pi ke di mi
gi fi ke ad su fi ke fi li ke gi pi ke fi li
ki fi ke ak su fi ke gi ki ke ki pi ke gi ki
li fi ke an su fi ke ki gi ke li pi ke ki gi
mi fi ke eb su fi ke li fi ke mi pi ke li fi
ni fi ke eg su fi ke mi di ke ni pi ke mi di
pi fi ke em su fi ke ni bi ke pi pi ke ni bi

pi ke pi	pio ke pi
an ke pi	nib ke pi
em ke pi	mid ke pi
il ke pi	*a*f ke pi
ok ke pi	ug ke pi
mid ke pi	em ke pi
nib ke pi	an ke pi

pi ke pi

Also:

$0 \times 5 = 0$	O su ki ke *O*
$1 \times 5 = 5$	bi su ki ke ki
$2 \times 5 = 10$	di su ki ke bi O
$3 \times 5 = 15$	fi su ki ke bi ki
$4 \times 5 = 20$	gi su ki ke di O
$5 \times 5 = 25$	ki su ki ke di ki
$6 \times 5 = 30$	li su ki ke fi O
$7 \times 5 = 35$	mi su ki ke fi ki
$8 \times 5 = 40$	ni su ki ke gi O
$9 \times 5 = 45$	pi su ki ke gi ki

Also:

$0 \times 7 = 0$	O su mi ke O
$3 \times 7 = 21$	fi su mi ke di bi
$6 \times 7 = 42$	li su mi ke gi di
$9 \times 7 = 63$	pi su mi ke li fi
$2 \times 7 = 14$	di su mi ke bi gi
$5 \times 7 = 35$	ki su mi ke fi ki
$8 \times 7 = 56$	ni su mi ke ki li
$1 \times 7 = 7$	bi su mi ke mi
$4 \times 7 = 28$	gi su mi ke di ni
$7 \times 7 = 49$	mi su mi ke gi pi

$0 \times 9 = 0$	O su pi ke O
$9 \times 9 = 81$	pi su pi ke ni bi
$8 \times 9 = 72$	ni su pi ke mi di
$7 \times 9 = 63$	mi su pi ke li fi
$6 \times 9 = 54$	li su pi ke ki gi
$5 \times 9 = 45$	ki su pi ke gi ki
$4 \times 9 = 36$	gi su pi ke fi li
$3 \times 9 = 27$	fi su pi ke di mi
$2 \times 9 = 18$	di su pi ke bi ni
$1 \times 9 = 09$	bi su pi ke pi

All prime numbers have for their units digit either

1	3	7	or	9
11	13	17		19
31	23	37		29
41	43	47		59
61	53	67		79
71	73	97		89
	83			

Any number not having one of the above four as its units digit is a composite number. Any composite number having one of the above four as its units digit must be divisible by either 3, 5 or 7.

Prime numbers, with 1 as the units digit, from 1 to 4001.

1	601	1201	2011	2801	3631
11	631	1231	2081	2851	3671
31	641	1291	2111	2861	3701
41	661	1301	2131	2971	3761
61	691	1321	2141	3001	3821
71	701	1361	2161	3011	3851
101	751	1381	2221	3041	3881
131	761	1451	2251	3061	3911
151	811	1471	2281	3121	3931
181	821	1481	2311	3181	4001
191	881	1531	2341	3191	
211	911	1571	2351	3221	
251	941	1601	2381	3251	
271	971	1621	2411	3271	
281	991	1721	2441	3301	
311	1021	1741	2521	3331	
331	1031	1801	2531	3361	
421	1051	1831	2551	3371	
431	1061	1861	2591	3391	
461	1091	1871	2621	3461	
491	1151	1901	2671	3491	
521	1171	1931	2711	3511	
541	1181	1951	2731	3541	
571			2741	3571	
			2791	3581	

Prime numbers with 3 as units digit from 3 to 4003.

3	433	1013	1523	2113	2903
13	443	1033	1543	2143	2953
23	463	1063	1553	2153	2963
43	503	1093	1583	2203	3023
53	523	1103	1613	2213	3083
73	563	1123	1663	2243	3163
83	593	1153	1693	2273	3203
103	613	1163	1723	2293	3253
113	643	1193	1753	2333	3313
163	653	1213	1783	2383	3323
173	673	1223	1823	2393	3343
193	683	1283	1873	2423	3373
223	733	1303	1913	2473	3413
233	743	1373	1933	2503	3463
263	823	1423	1973	2543	3533
283	853	1433	1993	2593	3583
293	883	1453	2053	2633	3593
313	953	1483	2063	2663	3623
353	983	1493	2083	2683	3643
373				2693	3673
383				2713	3793
				2753	3803
				2803	3823
				2833	3833
				2843	3863
					3923
					3943
					4003

Prime numbers with 7 as units digit from 7 to 4007.

7	457	1087	1747	2417	3217
17	467	1097	1777	2437	3257
37	487	1117	1787	2447	3307
47	557	1187	1847	2467	3347
67	577	1217	1867	2477	3407
97	587	1237	1877	2557	3457
107	607	1277	1907	2617	3467
127	617	1297	1987	2647	3517
137	647	1307	1997	2657	3527
157	677	1327	2017	2677	3547
167	727	1367	2027	2687	3557
197	787	1427	2087	2707	3607
227	797	1447	2137	2767	3617
257	827	1487	2207	2797	3627
277	857	1567	2237	2837	3677
307	877	1597	2267	2857	3697
337	887	1607	2287	2897	3727
347	907	1627	2297	2917	3767
367	937	1637	2347	2927	3797
397	947	1657	2357	2957	3847
	967	1667	2377	3037	3877
	977	1697		3067	3907
	997			3137	3917
				3167	3937
				3187	3947
					3967
					4007

Prime numbers with 9 as units digit from 19 to 4019.

19	509	1319	1949	2609	3209
29	569	1399	1979	2659	3229
49	599	1409	1999	2689	3259
59	619	1429	2029	2699	3299
79	659	1439	2039	2709	3319
89	709	1459	2069	2729	3329
109	719	1489	2089	2749	3359
139	739	1499	2129	2789	3389
149	769	1549	2179	2819	3449
179	829	1559	2229	2879	3469
199	839	1579	2239	2909	3699
239	919	1609	2269	2939	3529
269	929	1619	2309	2969	3539
349	1009	1669	2339	2999	3559
359	1019	1699	2389	3019	3659
379	1039	1709	2399	3049	3709
389	1049	1759	2459	3079	3719
409	1069	1789	2539	3089	3739
419	1109	1879	2549	3109	3769
439	1129	1889	2579	3119	3889
449	1229			3169	3919
479	1249				3929
499	1259				3989
	1279				4019
	1289				

ORDERS.

It is to be regretted that teachers of arithmetic talk of a square and of a cube root.

In the whole realm of creation there is no such mathematical element as a square or a cube root. There is a root of units, a root of squares and a root of cubes, but there is not, and never will be, a mathematical square or a cube root.

Wentworth and Hill say: "The square root of a number is one of its two equal factors."

It is unscientific to make one mathematical element applicable to two different symbols: the result is confusing. A factor is one of two or more numbers that are employed in forming a product. To call it a square or a cube root is wholly unscientific. The same able authority says: "A cube root of a number is one of the three equal factors of the number." 2 is one of the two equal factors of 4: it is also one of the three equal factors of 8: hence, according to the definition, 2 is both a square and a cube root—which is ridiculous.

To tell a pupil to find the square root of a certain number when no such thing exists is to add doubt and confusion to ignorance and leaves the novice duller than when he began his journey in the pursuit of knowledge. One can easily find the root of a square, since the number itself should tell its root. Why complicate difficulties?

Limitations of arithmetic are fixed or should be fixed to the consideration of units, squares and cubes. To go beyond these is to get into deep water before knowing how to swim. To attempt to impart knowledge that is beyond the pupil's comprehension and ability of reception is to speak folly.

These three classes, units, squares and cubes are as clearly defined and separated as are lines, squares and circles in geometry. All future success as a mathematician depends on the clear understanding regarding these demarcations.

One serious and vital mistake (and fortunate had it been for humanity if it were the only one) made by instructors in the science of numbers is in implying that because a square is a product of two equal factors and the cube is the product of three equal factors that the several factors of units, squares or cubes are, in any respect, alike. Units can be squared and cubed, squares are restricted, as are cubes; each to its own order.

Units are units; not squares nor cubes.

Squares are squares, not units nor cubes.

Cubes are cubes and are neither units nor squares.

UNITS.

Units are entities. There are units of squares and units of cubes as there are innumerable entities.

Units can exist of themselves but squares or cubes cannot have existence without units.

Units can be added, subtracted, multiplied or divided in any order, or in any manner, while squares and cubes must follow a prescribed rule.

Units are as the spirit of life. They come, we know not whence; they go, we know not whither, yet always existing, pliable and obedient to any will; to lie with the liar and to confirm the truth for the man of honor. To say that $2/5 \times 7/9 = 14/45$ is to utter a lie. The figures are made in ignorance and speak untruthfully. To say that $2/5 \times 7/9 = 1\text{-}8/45$ is to utter a truth that will endure any trial.

It is inexcusable to multiply a unit by a square or a cube, thus: $5 \times 2^2 = 20$, or $5 \times 2^3 = 40$.

There are various forms of units among numbers. There are prime numbers or those that cannot be exactly divided and which always (the number 5 alone excepted) have for the units or right

hand digit, a 1, 3, 7 or 9 and there are units of composite numbers.

A digit standing alone is a unit, thus 1, if it has another digit to its left, the one at the right is units, and the one on its left is the tens units thus: 12, 2 units and 1 tens units; then follows the hundreds units 123, followed by the thousands 1234, and continued indefinitely.

Units have orders and degrees as surely as do squares and cubes.

Taking multiples of units we have the following as the units digit.

1
2 4
2 8 2, 4, 6, 8 = 20
2 (1) 6
2 (3) 2
1
3 3
3 9
3 (2) 7 1, 3, 7, 9 = 20
3 (2) 1
1
4 4
4 (1) 6 4, 6 = 10
4 (2) 4
1
5 5 = 5
5 (2) 5

1
6 6 $= 6$
6 (3) 6

1
7 7
7 (4) 9 1, 3, 7, 9 $= 20$
7 (6) 3
7 (4) 1

1
8 8
8 (6) 4 2, 4, 6, 8 $= 20$
8 (3) 2
8 (1) 6

1
9 9 1, 9 $= 10$
9 (8) 1

Hence any number having the following in the upper line as a units digit is divisible by the number beneath it.

0	1	2	3	4	5	6	7	8	9
5	3	4	7	2	5	2	3	2	3
	7	6	9	6		4	9	4	7
	9	8		8		8			

provided the number is not a prime, in which case it is wholly indivisible and must have as the units digit a 1, 3, 7 or 9.

Even, or feminine, factors, 0, 2, 4, 6, 8 give an even or feminine units digit in the product, making it a feminine product.

Even factors with odd or masculine factors. 0 and 1, 2 and 3, 4 and 5, 6 and 7, 8 and 9, give a feminine product.

Odd, or masculine, factors as 1, 3, 5, 7, 9 give an odd or masculine units digit in the product.

SQUARES.

The confusing units, squares and cubes (wholly dissimilar quantities) in one measure, as is done by each and every arithmetic extant, is sufficient to bring condemnation upon all the present existing science of mathematics.

Squares cannot be (by whatsoever necromancy figures are manipulated) made to become cubes: nor can cubes be changed into squares. Yet mathematicians persist in driving their thick skulls against this *impasse.*

$2 + 2 = 4.$

4 is the square of the root 2.

$2 \times 2 = 4.$ $4 + 4 = 8.$ This 8 is not a cube of the root 2. It is two squares.

$2 \times 2 \times 2 = 8.$ This 8 has nothing to do with a 4. It is not and never was a square. This 8 is wholly different from the square's 8; this one is a cube 8 from the root 2.

$4 + 4 = 8 =$ two squares.
$8 \times 8 = 64 =$ two cubes.
$4 + 4 + 4 = 12 = 3$ squares.
$8 \times 8 \times 8 = 512 = 3$ cubes.

By the way what is a mathematical square?

It is the product of two equal factors.

What is a root of a square?

It is one of the two equal divisors of any number.

What is a mathematical cube?

It is the product of three equal factors.

What is a root of a cube?

It is one of the three equal divisors of any number.

In fact there is so little in common between units, squares and cubes that no comparison can be established.

Units are multiples of one.

Squares are surfaces.

Cubes are space.

What is there in common with these three?

A square 16 can be formed from the root 4; but 16 from the root 2 makes 3 squares. 8 is two squares from the root 2, and 32 is 2 squares from the root 4.

Hence it follows that a new mathematical nomenclature should be formed to distinguish units from squares and cubes and each from the other.

Regardless of the wonderful virtues, cleverness and simplicity of the Cho language herewith presented the only feasible way for making these necessary distinctions is the use of words similar to Cho.

Displace the 1 in each prime unit and insert an a to make that prime a root of a square or insert an *a* to make it a root of a cube. Add an a to a composite to make it a root of a square or an *a* to make it a root of a cube.

bi	1		l*a*	6	root cu. 216
di	2		mi	7	.....
da	2	root sq. 4	ma	7	root sq. 49
d*a*	2	" cu. 8	m*a*	7	" cu. 343
fi	3	.....	ni	8	.....
fa	3	root sq. 9	na	8	root sq. 64
f*a*	3	" cu. 27	n*a*	8	" cu. 512
gi	4	.....	nid*a*	8	cu. of root 2
ga	4	root sq. 16	pi	9	.....
g*a*	4	" cu. 64	pa	9	root of sq. 81
gida	4	sq. of root 2	p*a*	9	" cu. 729
ki	5	.....	pif	9	sq. of 3
ka	5	root sq. 25	ao	10	.....
k*a*	5	" cu. 125	aoa	10	root sq. 100
li	6	.....	ao*a*	10	" cu. 1000
la	6	root sq. 36	aoad	10	sq. of 100
ao*a*d	10	cu. of 100	ana	18	sq. 324
ab	11	.....	an*a*	18	cu. 5832
abe	11	root sq. 121	ap	19	.....
ab*a*	11	" cu. 1331	apa	19	sq. 361
ad	12	.....	ap*a*	19	cu. 6759
ada	12	sq. 144	eo	20	.....
ad*a*	12	cu. 1728	eoa	20	sq. 400
af	13	.....	eo*a*	20	cu. 8000
afa	13	sq. 169	eb	21	.....
af*a*	13	cu. 2197	eba	21	sq. 441
ag	14	.....	eb*a*	21	cu. 9261
aga	14	sq. 196	ed	22	.....
ag*a*	14	cu. 2744	eda	22	sq. 484
ak	15	.....	ed*a*	22	10648
aka	15	sq. 225	ef	23	.....

ak*a*	15	cu. 3375	efa	23	sq. 529
al	16	. . . . .	ef*a*	23	cu. 12167
ala	16	root of sq. 256	eg	24	. . . . .
al*a*	16	" cu. 4096	ega	24	sq. 576
alag	16	sq. root 4	eg*a*	24	cu. 12824
am	17	. . . . .	ek	25	. . . . .
ama	17	sq. 289	eka	25	sq. 625
am*a*	17	cu. 3913	ek*a*	25	cu. 15625
an	18	. . . . .	ekad	625	sq. of root 25
			ek*a*d	15625	cu. of root 25

Units	Squares			Units	Cubes			
1	4			1	8			
2	9	5		2	27	19		
3	16	7	2	3	64	37	18	
4	25	9	2	4	125	61	24	6
5	36	11	2	5	216	91	30	6
6	49	13	2	6	343	127	36	6
7	64	15	2	7	512	169	42	6
8	81	17	2	8	729	217	48	6
9	100	19	2	9	1000	271	54	6
10	121	21	2	10	1331	331	60	6
11	144	23	2	11	1728	397	66	6
12	169	25	2	12	2197	469	72	6
13	196	27	2	13	2744	547	78	6
14	225	29	2	14	3275	531	84	6
15	256	31	2	15	4096	721	90	6
16	289	33	2					
17	324	35	2					
18	361	37	2					
19	400	39	2					
20	441	41	2					

Thus it is evident that units are elements of one dimension.

Squares, of two dimensions: cubes, of three dimensions.

Just as well use a pig's tail for a yard stick as to try to measure volumes or capacities by cubes.

Yet students are told that cubes are for volumes and capacities!

By heavens! if the sea were not full of fish it would be well to deluge the land by filling it with scientists.

Cubes are for space and for nothing than space.

An empty square tin box is as much a cube as would be a square block of steel; the one takes exactly as much space as the other.

The special application of cubes in the ordinary affairs of life will be more fully illustrated in Part 2 of Cho Momo.

DIME.

Fractions.

Arithmeticians generally seemed obsessed by a notion that some meaningless adjective should qualify a fraction.

Why should a fraction be called "common," "proper," "improper" or "vulgar?"

One does not say a "common" 1, 2, 3, 4 or 5, nor a "vulgar" 6, 7, 8 or 9.

A fraction stands in the integrity of its usefulness entirely separate from other mathematical expressions.

It seems more than passing strange that of the millions of mathematicians none has pointed out the fact that whole numbers apply exclusively to one and its multiples while fractions have to do solely with parts of a special one, applicable separately to each individual fraction.

The indivisible one is never divided nor multiplied. It or He, if you care so to honor it, stands alone or if in the number 2,. the one is twice; in number 3, three times, etc. In fractions, for instance 1/2 (one half) the 1/2 is a part of the 2's one, thus: 2/2 = 1, and 1/2 of this is taken; not 1/2 of the Supreme One.

1/3 of 3/3, 1. 1/4 of 4/4, 1. 1/5 of 5/5, 1. 1/6 of 6/6, 1. 1/7 of 7/7, 1. 1/8 of 8/8, 1. 1/9 of 9/9, 1. 1/12 of 12/12, 1. 1/13 of 13/13, 1. 1/14 of 14/14, 1. etc.

Each fraction has two distinct parts, namely: a denominator and a numerator.

The denominator applies to that especial one that has in its numerator and its denominator quantities equal to this fractional denominator, thus: 1/2 is 1/2 of 1, but it is of the 2/2's 1.

The numerator is never applicable to the 1 indicated by the denominator, but applies solely to the number of times its own denominator is taken and it has no other possible function.

When a numerator is greater than its denominator the figures cease to be a fraction because the numerator in that case applies, in some respect to other than its own denominator, thus: 6/3 is not a fraction; it is the whole number 2 written in the form of a fraction: in the case of 8/3 the fractional form is 2-2/3, a whole number and a fraction.

What then is the right definition for a fraction?

A fraction is the expression of parts of 1.

The Cho language uses the cardinal for the expression of the numerator and the ordinal for that of the denominator, thus:

bi die	di fie	fi gie	gi kie	ki lie
1/2	2/3	3/4	4/5	5/6
li mie	mi nie	ni pie	pi aoe	ao abe
6/7	7/8	8/9	9/10	10/11
ab ade	ad afe	af age	ag ake	ak ale
11/12	12/13	13/14	14/15	15/16
al ame	an ane	an ape	ap eoe	eo ebe
16/17	17/18	18/19	19/20	20/21

SUME.

Multiplication of Fractions.

Of all the hideous atrocities of arithmeticians the multiplication of fractions surely deserves the crown for idiocy, for consummate silliness, for the quintessence of assininity that brays at highest heaven.

They (all of them, everywhere) assert that $1/3 \times 1/5 = 1/15$ of the whole.

That is to say: 1/3 of one dollar, or 33 1/3 cents, multiplied by 1/5 of one dollar, or 20 cents, equals 1/15 of one dollar or 6 2/3 cents!

They say that $1/2 \times 1/2 = 1/4$.

They say that $4 \times 1/4 = 1$. That is to say that one having 4 dollars multiplies it by a quarter of a dollar and loses three dollars!

One high authority says: "Multiplication of fractions is the operation of taking one number as many times as the units in another, when one or both are fractions."

Is not the above about as clear as dense mud?

Another equally high (or low) says: "To find the value (sic) of a fraction; or, to multiply a fraction by a fraction, is as: 4/5 multiplied by 2/3, which means 2/3 of $4/5 = 8/15$."

The above is simply criminal. If it had been

uttered by a nontutored (if such word is admissible) savage: (no, the pardon of the savage is asked!)

Let us examine the problem.

$$4/5 \times 2/3 = 4 \times 3 = 12$$
$$2 \times 5 = 10$$
$$\overline{22}$$
$$5 \times 3 = \overline{15} = 1\text{-}7/15$$

Which bears the greater probability of correctness, 1-7/15 or 8/15?

Remember that the example given above for the correct method for multiplying a fraction is the first time in the history of man. Yet how simple it is. Only why was it not seen before?

2/3 of 4/5 is wholly a different problem and has nothing to do with $4/5 \times 2/3$.

The same authority quoted above gives one more example, which is copied letter by letter, as follows:

"$(12/25 \times 2\ 13/16 \times 10/21 = 12/25 \times 45/16$

$$\times\ 10/21 = \overset{3}{12}/\underset{5}{25} \times \overset{9}{45}/\underset{4}{16} \times \overset{5}{10}/\underset{7}{21} = 9/14)"$$

$$2$$

The above redundant figures are as published in the arithmetic under consideration.

There is not the least necessity, justification or sense in using cancellation among these figures. It is the original fractions 12/25, 2 13/16, 10/25 that are to be multiplied and not some others.

Take the problem under intelligent analysis and see the result.

$$12/25 \times 45/16 \times 10/21 =$$

$$\begin{aligned} 12 \times 16 \times 21 &= \ 4032 \\ 45 \times 25 \times 21 &= 23625 \\ 10 \times 25 \times 16 &= \ 4000 \\ \hline & \ 31657 \\ 25 \times 16 \times 21 &= \ 8400 \end{aligned} = 3\text{-}6/8;$$

hence $12/25 \times 45/16 \times 10/21 = 3\text{-}6/8$.

They say that $1/3 \times 1/5 = 1/15$

Let us see by the right method.

$$1/3 \times 1/5 = \begin{aligned} 1 \times 5 &= \ 5 \\ 1 \times 3 &= \ 3 \\ \hline & \ 8 = 8 \\ 5 \times 3 &= 15 \quad 15 \end{aligned}$$

1/3 of one dollar is 33 1/3 cents
1/5 " " " " 20 "
1/15 " " " " 6 2/3 "
8/15 " " " " 53 1/3 "

Which is most probably correct?

They say that $4 \times 1/4 = 4/4 = 1$; that is to say that if one has 4 dollars and multiplies it by 1 quarter of one dollar he loses 3 dollars. Nice arithmetic that would be surely.

It has never been previously observed by any author that the multiplication by fractions have at least five different methods of procedure.

Case 1. Is where a fraction is multiplied by a fraction, as: $2/5 \times 7/9$.

No words of execration can express the utter contempt for those mathematicians (and the world

seems full of such fools) who promulgate the following:

"Multiply the numerators together" (how can one multiply them separately?) "for a new numerator, and the denominators together (sic) for a new denominator" thus: they say, "$2/5 \times 7/9 = 14/45$." What have the whole numbers 2 and 7 to do with the fraction $2/5$? or 5 and 9 to do with $7/9$?

The one right way (until a better is found) is to take the following rule.

Rule I. For the multiplication of fractions. Take the sum of the products of each numerator with all the denominators, its own excepted, to get the multiplied numerator, and take the product of all the denominators for the required denominator, thus:

$$\begin{aligned} 2/5 \times 7/9 = 2 \times 9 &= 18 \\ 7 \times 5 &= 35 \\ \hline 5 \times 9 &= \overline{45} \end{aligned} \quad \begin{aligned} &\\ &\\ \overline{53} &= 1\text{-}8/45 \end{aligned}$$

$$\begin{aligned} 20/21 \times 3/7 \times 4/9 \times 2/3 &= \\ 20 \times 7 \times 9 \times 3 &= 3780 \\ 3 \times 21 \times 9 \times 3 &= 1701 \\ 4 \times 21 \times 7 \times 3 &= 1764 \\ 2 \times 21 \times 7 \times 9 &= 2646 \\ \hline 21 \times 7 \times 9 \times 3 &= \overline{3969} \end{aligned} \quad \begin{aligned} &\\ &\\ &\\ &\\ \overline{9891} &= 2\text{-}31/63 \end{aligned}$$

Case 2. Is where a fraction is multiplied by a whole number, as $1/4 \times 4$.

Under the admitted premises that as the numerator increases, the denominator remaining unchanged, the fraction is multiplied we have:

$1/4 \times 4 = 4/4 = 1$ $\quad$ $1/2 \times 2 = 2/2 = 1$

$2/4 \times 2 = 4/4 = 1$ $\quad$ $2/3 \times 3 = 6/3 = 2$

$3/4 \times 2 = 6/4 = 1\text{-}1/2$ $\quad$ $3/9 \times 5 = 15/9 = 1\text{-}2/3$

$4/4 \times 2 = 8/4 = 2$ $\quad$ $4/5 \times 5 = 20/5 = 4$

Rule II. A fraction multiplied by a whole number is its numerator multiplied by the number.

Case 3. Is where a whole number is multiplied by a fraction, as: $4 \times 1/4 = 4\text{-}1/4$

$$\begin{aligned} 4/1 \times 1/4 = 4/1 \times 1/4 &= 4 \times 4 = 16 \\ 1 \times 1 &= 1 \\ \hline 1 \times 4 &= 17/4 = 4\text{-}1/4 \end{aligned}$$

$$\begin{aligned} 4\ 1/4 \times 1/4 = 17/4 \times 1/4 &= 17 \times 4 = 68 \\ 1 \times 4 &= 4 \\ \hline 4 \times 4 &= 72/16 = 4\text{-}1/2 \end{aligned}$$

$$\begin{aligned} 1/4 \times 1/4 = 1 \times 4 &= 4 \\ 1 \times 4 &= 4 \\ \hline 4 \times 4 &= 8/16 = 1/2 \end{aligned}$$

$$\begin{aligned} 9 \times 5/6 = 9/1 \times 5/6 &= 9 \times 6 = 54 \\ 5 \times 1 &= 5 \\ \hline 1 \times 6 &= 59/6 = 9\text{-}5/6 \end{aligned}$$

Rule III. A whole number multiplied by a fraction equals the number plus the fraction.

Case 4. Is where a whole number is multiplied by a whole number and a fraction, as: $4 \times 2\text{-}1/4$

Here is a case requiring carefulness. It was stated in case 3 that a whole number multiplied by a fraction equals the number plus the fraction, but that will not prevail when the whole number has already been used by the number to which the fraction is adjoined, thus: while $4 + 1/4 = 4\ 1/4$. When the 1/4 is adjoined to a whole number only the fractional part can be taken.

One cannot work this case as follows:

$$\begin{array}{r} 4 \\ 2\text{-}1/4 \\ \hline 8 \\ 4\text{-}1/4 \\ \hline 12\text{-}1/4 \end{array}$$

The product would be too great. It is $4 \times 2 = 8$ and 1/4 of $4 = 1$. $8 + 1 = 9$.

Again: $9 \times 3\text{-}6/7$.

$$\begin{array}{r} 9 \\ 3\text{-}6/7 \\ \hline 27 \end{array}$$

Now, one has to take 1/7 of the $9 = 1\text{-}2/7$, which multiplied by $6 = 7\text{-}5/7$. $27 + 7\text{-}5/7 = 34\text{-}5/7$.

Rule IV. A whole number multiplied by a whole number and a fraction is the product of the two whole numbers plus the fractional part of the multiplican.

One other problem remains.

Case 5. Is where a whole number and a fraction are multiplied by a whole number and a fraction, as:

4-2/3 × 2-1/5.

$$\begin{array}{l} \underline{4\text{-}2/3} \\ 2\text{-}1/5 \\ 8 \\ 1\ (1/3) \\ \underline{2} \\ 11 \end{array} \qquad \begin{array}{l} 2/3 \times 2 = 4/3,\ 1\text{-}1/3 \\ \\ 1/5 \text{ of } 4 = 4/5, \\ \\ \end{array}$$

because

$$4 = 16/4 \div 1/5 = 16/20 = 4/5$$

$$2/3 \times 1/5 = \begin{array}{l} 2 \times 5 = 10 \\ 1 \times 3 = \underline{\ 3} \\ \qquad\quad \underline{13} \\ 3 \times 5 = 15 \end{array}$$

$1/3 + 4/5 + 13/15 = 5/15 + 12/15 + 13/15 = 30/15 = 2.$

Hence, 4-2/3 × 2-1/5 = 11.

Rule V. When a whole number and a fraction are multiplied by a whole number and a fraction, the product is the multiplican multiplied by the whole number in the multiplier plus the fraction in the multiplican multiplied by the whole number in the multiplier plus the fractional part of the fraction in the multiplier of the whole number in the multiplican plus the product of the two fractions.

Has any arithmetic prior to the present publication dared to enter into a thorough exposition of multiplication of fractions?

They say: "14 × 3/7 = 6," and give the following remarkable illustration,

"7)14

—

2 × 3 = 6"

and

"14

3

—

7)42

—

6"

Could any thing be more crude?

It has been shown above, in rule II. that "a whole number multiplied by a fraction equals the number plus the fraction," hence the above example works itself.

14 × 3/7 = 14-3/7

Prove it: 14/1 × 3/7 = 14 × 7 = 98

3 × 1 = 3

—

101

1 × 7 = 7 = 14-3/7

By what right did they afflict humanity with such a blunder as "14 × 3/7 = 6"?

They say "7/8 × 3/5 = 21/40"

Do they?

7/8 × 3/5 = 7 × 5 = 35

3 × 8 = 24

—

59

8 × 5 = 40 = 1-19/40

They give this display of stupidity:

"$7/11 \times 11/21 = \cancel{7}/\cancel{11} \times \cancel{11}/\cancel{21} = 1/3$"

3

What has cancellation to do with this job? It is none of its business.

$$7/11 \times 11/21 = 7 \times 21 = 147$$
$$11 \times 11 = 121$$
$$\overline{}$$
$$11 \times 21 = \frac{268}{231} = 1\text{-}37/231$$

Hundreds of similar examples can be given were it not for idly filling space.

RECIPROCALS.

Whence came this—this—(Oh, for words capable of painting idiocy in true colors)—execrable rot?

Reciprocals!

Of what?

Why does a fraction need a reciprocal?

To enable fools to divide a fraction wrongly.

They say that 9/7 is a reciprocal of 7/9!!

Why?

They did not know how to divide 8/9 by 7/9, hence they turned the 7/9 upside down and made it stand on its head, as 9/7, and said "$8/9 \div 7/9 = 8/9 \times 9/7 = 72/63 = 1\ 9/63$"! ! !

Writing of reciprocals one of the standard arithmetics of this age prints the following atrocity.

"The reciprocal of a number is 1 divided by the number, thus: the reciprocal of 4 is 1/4, for (sic) $4 \times 1/4 = 1$. The reciprocal of a fraction is the fraction with its terms interchanged, thus: 7/3 is the reciprocal of 3/7, for (sic) $7/3 \times 3/7 = 1$."

Can any conceivable thing be worse than the above quoted words? A fool purposely practicing folly for generations, finally believing folly to be truth, could not produce an offspring of greater idiocy. Yet millions of teachers and ten millions of scholars have stumbled over that barbarism.

Once upon a time a master said to his slave,

Aesop: "Go thou to the bath and see how many men are there. Bring me word that I can bathe and be clean."

Aesop sat at the entrance while a vast number of people pushed through an obstructed passage to the bath. Many were injured, some fatally, and few reached the cleansing waters. Aesop saw a great flinty rock in the middle of the path leaving only a small passage way on either side. Inquiring he learned that the rock had been placed there by powerful, ancient Magi and no man had been found capable of removing it.

"How long has it been here?" he asked.

"Since the time Cain slew his brother Abel," was the answer.

Aesop then by the might of his shoulder rolled the rock away and the crowd rushed in and out without thought and without a word of thanks.

Coming to his master he said: "Gracious lord and sovereign, I found but one man at the bath."

Then the master hastened.

Reaching the bath he found a gay, happy multitude.

"What meanest thou, slave?"

"Oh, master, when I came I sat at the door and saw the crowd fighting for entrance, none attempting to remove the rock that stood in the way. Then came a man who looked, acted and took away the stone that had lain there for many ages: and he I thought to be the only one man."

"Who and where is he that did this great thing?" inquired the lord.

"Let your slave, most gracious master, whisper a word. I think I know the fellow. He, as I, is merely a slave. If my lord were to inquire for him he will presume and think himself greater than my master."

"Aesop," the master said, "you are right and I was wrong. Let the fellow go. Do thou, slave, accompany me, and cleanse me."

What is a reciprocal?

It is a wild, undisciplined Hottentot captured by a ruse in a Brazilian jungle of South Africa and made to serve by forever standing on his head to divide a fraction, thinking the farther he separates his feet the better he has performed the task.

If the word "reciprocal" were not tarnished by association with ignorance it possibly could be accepted to express an important associate of each fraction to which associate Cho now gives the name *Koad*. 7/9 has the koad 2/9. 2/9 has the koad 7/9.

$$7/9 + 2/9 = 9/9 = 1$$
$$2/9 + 7/9 = 9/9 = 1$$
$$3/5 + 2/5 = 5/5 = 1$$
$$1/9 + 8/9 = 9/9 = 1$$

Each is a koad of the other.

TUME.

Division of Fractions.

If incisive language was used in criticising the deficiencies of mathematicians with reference to the multiplication of fractions, not less can be said, and the English language is not vigorous enough to say more, regarding their presentation of division of fractions.

Surely it promises little hope for the accuracy of any science of the present day when the foundation of all (mathematics) is so rotten.

One of the standard arithmetics says: "Division of fractions is the operation of finding how many times one number is contained in another, when one or more (sic) are (sic) fractions."

Now what sense is in such words?

Who can understand such vague, confused mixture of terms? What has one number contained in another number to do with fractions?

The same authority asks: "What is the quotient of 7/8 divided by 14/5?" and gives the following bosh: "$7/8 \div 14/5 = 7/8 \times 5/14 = 35/112 = 5/16$."

In the first place $14/5 = 2\text{-}4/5$.

How can 7/8 be divided, by any process, by 2-4/5?

They say that this 5/14 is the reciprocal of 14/5.

14/5 has no such possible element as a reciprocal: nor, in fact, has any fraction such unnecessary mathematical fiction.

The above, like its colleagues, gives the following nonsensical law for dividing fractions.

"Invert the terms of the divisor, cancel, and proceed as in multiplication."

Can words express the shame of such display of ignorance?

Yet governments sanction by permission and financial support the teaching to children such folly!

Another recognized authority taught in the public schools has the following: "Multiplying by the reciprocal of a number is the same as dividing by that number; therefore, to divide by a whole number or a fraction, thus:

"$3/5 \div 4 = 1/4$ of $3/5 = 1/4 \times 3/5 = 3/20$."

and

"$3/5 \div 7/8 = 8/7$ of $3/5 = 8/7 \times 3/5 = 24/25$."

If the above were not reprinted in the exact words used in the original publications our words could give little conception of their heinousness.

The last named authority adds: Divide 14/17 by 7, and gives 2/17 as its answer.

It says: "It is evident that the fraction 14/17 is divided by dividing its numerator by 7, since the size of the parts, as denoted by the denominator, remains the same, while the number of parts taken is only 1/7 as large as before."

Who can understand such vague, unintelligible language?

In every arithmetic published the student is required to divide a fraction by a whole number, as in the example.

"$3/5 \div 4 = 1/4$ of $3/5 = 1/4 \times 3/5 = 3/20$."

Any mathematician of even mediocre ability should know that there are no arithmetical figures capable of dividing a fraction by a whole number: nor, in fact, can any number be divided, arithmetically, by a number greater than itself. One cannot divide 5 by 8; then more surely one cannot divide 3/5 by 4. To be sure 3/5 of any one thing can be divided into 4 parts, but the 3/5 are, in that case, as though they were 1.

There is one case and only one where there is an apparent exception to the universality of the above statement that a lesser number can never be divided, arithmetically, by a greater; and since this one exception has never before been presented by any known mathematician it is given here as "something new under the sun."

Number 1, only, of all the numbers, can be divided by any greater number.

And this number 1 is not the one indivisible one.

The 2's 1 can be divided by 2
" 3's 1 " " " " 3
" 4's 1 " " " " 4
" 5's 1 " " " " 5

and so through every possible number.

Recalling the admitted premises, as given under multiplication of fractions, that "when the denominator is increased, its numerator remaining unchanged, the fraction is divided," we have:

$$2/2\ (1) \div 2 = 2/4 = 1/2.$$
$$3/3\ (1) \div 3 = 3/9 = 1/3.$$
$$4/4\ (1) \div 4 = 4/16 = 1/4.$$
$$5/5\ (1) \div 5 = 5/25 = 1/5.$$
$$16/16\ (1) \div 16 = 16/256 = 1/16.$$

Can 1/6 be divided by 2?

No. The 1/6 can be halved by 2, and this 1/2 of 1/6 is 1/12 of the whole, but it is not 1/12 of 1/6.

Cho presents the following different cases for the division of fractions.

Case 1. Is where a fraction divides a fraction, as: $7/9 \div 2/5$.

Rule I. A fraction divides a fraction when the sum of their numerators and the product of their denominators are taken, thus:

$$7/9 \div 2/5 = \begin{matrix} 7 + 2 \\ 9 \times 5 \end{matrix} = 9/45 = 1/5$$

Case 2. Is where a whole number is divided by a fraction, as: $6 \div 3/5$.

Thus:

Rule II. A whole number is divided by a fraction when it is divided by the denominator and the quotient is multiplied by the numerator, thus:

$$6 \div 3/5 = 6/5 = 1\text{-}1/5 \times 3 = 3\text{-}3/5,$$

but when the whole number is less than the denominator of the fraction, rule I has to be employed thus:

$$6 \div 7/9 = \begin{matrix} 6 & + & 7 \\ 1 & \times & 9 \end{matrix} = 13/9 = 1\text{-}4/9.$$

Case 3. Is where a whole number and a fraction are divided by a fraction, as: $6\text{-}2/7 \div 7/9$.

Rule III. Divide the whole number by the fraction according to rule I, or II, and add the division of the two fractions, thus:

$$6\text{-}2/7 \div 7/9 = 6 \div 7/9 = \begin{matrix} 6 & + & 7 \\ 1 & \times & 9 \end{matrix} = 13/9 = 1\text{-}4/9.$$

$$2/7 \div 7/9 = \begin{matrix} 2 & + & 7 \\ 7 & \times & 9 \end{matrix} = 9/63 = 1/7.$$

$$4/9 + 1/7 = 28/63 + 9/63 = 37/63.$$

$$1 + 37/63 = 1\text{-}37/63.$$

Case 4. Is where a whole number and a fraction are divided by a whole number, as:

$$6\text{-}2/3 \div 2.$$

Rule IV. Divide the whole number of the dividend by that of the divisor, and add the koad of the fraction.

$6 \div 2 = 3$. Koad of $2/3$ is $1/3$.

Hence, $6\text{-}2/3 \div 2 = 3\text{-}1/3$.

Case 5. Is where a whole number and a fraction are divided by a whole number and a fraction, as: $6\text{-}2/3 \div 2\text{-}5/7$.

Rule V. Divide the whole number of the dividend by that of the divisor, and add the division of the two fractions, thus:

$$6\text{-}2/3 \div 2\text{-}5/7 = 6 \div 2 = 3 + (2/3 \div 5/7)$$

$$1/3 = 3\text{-}1/3.$$

Here is an easy example that any student of ordinary skill should be able to solve: Divide 111 by 5-1/2 that the quotient multiplied by 5-1/2 will reproduce 111.

All of the above examples are presented in a new method which will have to be legalized.

Are any, or all of them, exactly correct?

Possibly, no, and in fact, probably, no.

They are correct until someone proves their defects and presents a better. It may be the good fortune of the author of Cho Momo to do better, but the crown of reward will come to the one who shows a better way for doing anything; and the one who accomplishes this is the victor.

The following examples are taken from standard school arithmetics. One says:

"(Ex. 1. Divide 14/17 by 7. Ans. 2/17.)"

"First operation."

$$14/17 \div 7 = 2/17.$$

"It is evident that the fraction 14/17 is divided by 7 by dividing its numerator by 7, since the size of the parts, as denoted by the denominator, remains the same, while the number of parts taken is only 1/7 as large as before."

Remember the above was not uttered by an acknowledged ignoramus. It was written by a master of arts.

Since no fraction can be divided by a whole number the above example is a farce.

Divide 12/13 by 6/13. Ans. 2.

It says: "Since the fractional units (sic) of the two fractions are of the same kind, it is evident that 12/13 contain 6/13 as many times as 6 is contained in 12; $12 \div 6 = 2$. Therefore, when the fractions have a common denominator, (sic) the division can be performed as in whole numbers by dividing the numerator of the dividend by the numerator of the divisor."

The above is simply despicable.

Let us properly divide 12/13 by 6/13.

$$\begin{matrix} 12 & + & 6 \\ 13 & \times & 13 \end{matrix} = 18/169$$

hence $12/13 \div 6/13 = 18/169$

and how by any force of imagination can fractions less than 1 make the whole number 2?

They give the following poisonous mess of pottage.

"Divide 7/10 by 7/62. Ans. 6-1/5."

"$7/10 \div 7/62 = 7/10 \times 62/7 = 62/10 =$ 6-1/5."

As a matter of fact,

$$7/10 \div 7/62 = \begin{matrix} 7 & + & 7 \\ 10 & \times & 62 \end{matrix} = 14/620 = 7/310.$$

And the following horrible dish:

"Divide 9/28 by 3/7 and 3/4"

$$\text{"}9/28 \div 3/7 = 9 \frac{28}{3} \times 7 \frac{3}{4} = 3/4."$$

As a matter of fact,

$$9/18 \div 3/7 = \frac{9 + 3}{18 \times 7} = 12/126 = 2/61.$$

Then one more miserable contortion.

Divide 27-3/5 by 6. Ans. 4-3/5.

$$6)\overline{27\text{-}3/5}$$

$$\overline{4 + 3\text{-}3/5}$$

$3\text{-}3/5 = 18/5$ Which multiplied by $6 = 18/30 = 3/5$

$4 + 3/5 = 4\text{-}3/5.$

That is simply dreadful, especially that the 3/5 cannot be divided by 6 in any manner.

THE MU LE

THE MU LI

The Least Common Denominator.

Of all the silly contrivances concocted for the confusion of civilization the "least common denominator" is not the least.

There is properly no such thing as a least common denominator.

It is a mathematical law that only like units can be added or subtracted.

2/7, 3/8, 4/9, 7/12 and 8/15, in their present form cannot be added.

It is necessary that some method shall be contrived for giving each of the above fractions a similar denominator without changing the value of any of the fractions.

Fortunately a method has been found and it is the one untarnished gem of the old regime.

If the numbers 7, 8, 9, 12 and 15 are taken, regardless of the fact that they are similar to those in the several fractions, we can, by multiplying their several divisors and primes, find a one number, and only a one number from these especial numbers, that will give a similar denominator for the several given fractions, thus:

3)7, 8, 9, 12, 15
2)7, 8, 3, 4, 5
2)7, 4, 3, 2, 5
7, 2, 3, 5

$3 \times 2 \times 2 \times 7 \times 2 \times 3 \times 5 = 2520$. This 2520 is the one only multiple these numbers can produce.

It in itself is not a denominator though it can be used as such. It is called by Cho the mu le of those several numbers.

Now if this mu le, or 2520 is divided by 7 we have 360.

It is a known and generally admitted law since it can be easily proven, that if the numerator and the denominator of any fraction are multiplied by the same number the value of the fraction is unchanged.

If both terms of the fraction 2/7 are multiplied by 360 we have a fraction of equal value in 720/2520. This 360 is the mu li of the fraction 2/7. It has nothing to do with a least common denominator. If the fraction 3/8 is similarly treated by its mu li 315 we have 945/2520, so also with the fraction 4/9 by its mu li 280, 1120/2520: the fraction 7/12, by its mu li, 210, gives 1470/2520: in 8/15, the mu li 168 makes it 1344/2520.

Not one of the beautiful, clear and grand results are due to a least common denominator and the dragging in of such useless expression is confusing.

The method by which the above result is gained, so necessary for adding or subtracting fractions, is

the one treasure found in the heap of waste material of the present day arithmetics. The author of Cho Momo thankfully does it all the honor possible.

PUME

Addition of Fractions.

Surely fractions are fascinating. The more they are added the sooner they are ended. With whole numbers addition can continue eternally: in fractions, when the numerator and the denominator become identical, or when the numerator becomes greater (top heavy as it were) than its denominator, the fraction ceases.

In fractions there are two terms, a numerator and a denominator. In multiplication of fractions all the terms mutually act; in division the denominators are multiplied and the numerators are added; in addition and in subtraction the values of the denominators are unchanged, only the numerators are affected: in addition added, and in subtraction subtracted.

No two or more fractions of unlike denominators can be added. Their denominators must be made similar without injuring the value of the fractions, thus: 1/2, 2/3, 4/5, and 5/6 cannot be added until the denominator of each is made alike.

Take a 2, 3, 5, and 6, we find a mule, thus:

$$\begin{array}{r} 2)\,2,\ 3,\ 5,\ 6 \\ \hline 3)\quad 3,\ 5,\ 3 \\ \hline 5 \end{array}$$

$$2 \times 3 \times 5 = 30.$$

We give to 1/2, the muli 15 and get 15/30, to 2/3, the muli, 10, and find 20/30, 4/5 has the muli 6, and 24/30 result. 5/6 has muli 5, and then we multiply both terms and get 25/30, hence 15/30 + 20/30 + 24/30 + 25/30 = 84/30 = 2-4/5.

There is nothing confusing in the addition of fractions. With the magical assistance of the mule and the muli they flow spontaneously to their sum.

RUME.

Subtraction of Fractions.

The assistance of the wonderful muli makes subtraction of fractions nearly as easy as subtraction of whole numbers.

Under the law that only similars can be conjoined or separated, in subtraction, as in addition it is necessary to give the two fractions employed like denominators without destroying the value of the fractions.

In addition any number of fractions can be added, but in subtraction only two fractions, the minuend and the subtrahend, are practicable.

When but two fractions are engaged in addition or in subtraction finding the mule is not required.

Since the number that is the denominator of the other fraction is the muli, thus: in 7/9 — 2/5, the 5 of the 2/5 is the muli of 7/9, thus 7/9 × 5 = 35/45, and the 9 of the 7/9 is the muli of 2/5, thus: 2/5 × 9 = 18/45: and 35/45 — 18/45 = 27/45. This is invariable for the subtraction of fractions, consequently the problem is exceedingly easy.

Only one feature need be emphasized. That is when a fraction is subtracted from a whole number, thus: 3 — 1/5. The 1/5 is not subtracted from a supposed cipher, but from one of the ones in the three and this one has a fractional form to accord with

the fraction that acts as the subtrahend, thus: in 3 — 1/5, the 3 becomes 2 and the 1 is 5/5. 5/5 — 1/5 = 4/5, hence 3 — 1/5 = 2-4/5. In 9 — 3/8, one of the nine's ones, becomes 8/8, and from this the 3/8 are taken, thus: 8/8 — 3/8 = 5/8, hence 9 — 3/8 = 8-5/8, and 16 — 5/12 = 15-7/12.

RATEO.

RATIO.

(Pronounced by Cho rateo that a fluent and universal pronunciation of mathematical expressions shall prevail.)

It is surprising that such a general misconception of this very useful agent exists. It is made a fraction by every writer though it has neither the form, the uses nor functions of a fraction. The scientific attempts to wrongly describe ratio would be amusing if they were not fatally injurious to human progress.

One of the standard authorities blindly says: "The relative magnitude of two numbers is called their ratio, when expressed by the fraction which the first is of the second."

Where is the sense in such expression?

One number is larger or smaller than another, but what kind of mathematical equation is relative magnitudes of two numbers? Who can understand the meaning of the words, "which the first is of the second"?

Continuing it says: "The terms of a fraction are called the terms of the ratio: the numerator is called the antecedent, the denominator is called the consequent."

Why was not this surprising fact taught under

the head of fractions? No one previously knew that a numerator is an antecedent. What is the authority for such statement? Yet it is blindly repeated by every arithmetic.

It says: "2/3 is (sic) often written 2:3." How can a third rightly become a three? Nor can grammatical two-thirds take a singular predicate.

It says: "5/7 = 5:7." Why?

Can a seventh be in any sense a seven?

Enough of that authority!

Another authority says: "The comparison by ratio is made by considering how often one number contains, or is contained in another, thus: the ratio of 10 to 5 is expressed by 2, the quotient arising from the division of the first number by the second, or it may be expressed by 5/10 = 1/2, the quotient arising from the division of the second by the first, as the second or the first number shall be regarded as the unit or standard of comparison. "In general, of the two methods, the first is regarded as the more simple and philosophical, and therefore has the preference in this work. Which of the two methods is to be preferred is not a question of so much importance as has been supposed, since the connection in which ratio is used is usually such as to readily determine its interpretation."

Heavens! think of the verbal construction of the above. The printer's devil should have been consigned to a dark cellar with a blue pencil and orders to "cut it out."

To be sure we have known, through instruction of the operation of division that 10 divided by 5 equals 2, but we never knew that 10 divided by 5 also equals 1/2. 1/2 of what is this 1/2? How did they manage to make two whole numbers 10 and 5 a fraction 5/10? Did ratio perform that wonderful deed?

Let us drop these mathematical instructors as incompetent to perform a simple duty and refer to our two standard dictionaries, hoping for better results.

Webster's dictionary says: "The relation which one quantity or magnitude bears to another of the same kind. It is expressed by the quotient of the division of the first by the second, thus: the ratio 3 to 6 is expressed by 3/6 or 1/2; of *a* to *b* by a/b; or (less commonly) by the second term to make the dividend, as: $b:a = b/a$."

The condemnation of the mathematical authority carries the same sentence against Webster.

How can any necromancy convert a six into a sixth? What possible bearing has a one-half with a three or a six? 3 and 6 are whole numbers, 3/6 is a fraction. How can two dissimilar elements enter into comparison?

Let us try the Century dictionary, hoping for some better explanation of ratio than is given by any of the above quoted authorities.

The Century says: "The relation between two similar magnitudes in respect to quantity: the rela-

tion between two similar quantities in respect to how many times one makes so many times the other: there is no intelligible difference between a ratio and a quotient of similar quantities; they are simply two modes of expression connected with different association. But it was contrary to the old usage to speak of a ratio as a quantity—a usage leading to intolerable complications. Instead of saying that the momentum of a moving particle is the product of its mass into its velocity—a mode of expression both convenient and philosophical—the older writers say that the momenta of two particles are in compound ratio of their masses and velocities."

Now, think of that!

Instead of saying Mohammed came to the mountain the older writers asserted the mountain went to Mohammed.

What has momentum and velocity to do with ratio? Ratio as given by the Century is bad enough without " compounding" it. We have heard of " innocuous desertude" and here the Century perpetrates "intolerable complications."

Then it remains that the field is open for any one who can do better than the best that has been done, and the field is always open everywhere and in anything for such daring aspirant.

Cho's definition for ratio is: the proportion two or more numbers bear to each other as compared with number 1.

Thus:

10 : 5 :: 1 :1/2
5 :10 :: 1 :2
6 : 3 :: 1 :1/2
3 : 6 :: 1 :2

If this is not to be the accepted definition and those given by the quoted authorities is to receive approval as well erase ratio from the science of mathematics.

If the crown of approval is to be given Cho Momo for the promulgation of this law for ratio humanity can aspire to preparation for great achievements.

OTEOM, PERCENTAGE

Oteo, % Per cent.

Oteom, or percentage is all, or part of all, of anything.

There are two universally prevailing—(what word is suitable for these imponderable quantities?)—states, namely: the ever present, the everywhere existent environment and the permanent, stable, unchangeable yet ever changing oteom. However minute, however scarce any substance, yet it is 100 oteo: however large, or universal the substance, yet it is also 100 oteo.

If all the inhabitants of the earth were collected in one number that number would be 100 oteo. Suppose that number to be 1000, one-half of the 1000 or 500 are affirmative and 500 are negative.

The 500 affirmative are 100 oteo affirmative and the 500 negative are 100 oteo negative. This balance is forever existing and is forever observed even to the weight of a single hair on the head of any one of the 100 oteo.

If any single one of the negative 100 oteo thinks to become a portion of the affirmative 100 oteo then at that very moment some one of the 100 oteo affirmative

is beginning to change place, thus keeping the 100 oteo of either side exactly balanced.

If 100 men possess 80% of the wealth of the earth all the balance of humanity would have to subsist from the remaining 20 oteo. If one man were wholly good he would possess the 100 oteo of goodness and all the others would, of necessity, be wholly evil. A genius is an evil for any age, since all others have lost power in proportion to his gain. If one were perfectly healthy all others would be wholly diseased.

Hence you see that the study of oteom is worthy your deepest attention.

1	%	(oteo)	is	1/100	. . . . .	part	of	any	one	thing
2	”	”	”	2/100	or 1/50	”	”	”	”	”
4	”	”	”	4/100	” 1/25	”	”	”	”	”
5	”	”	”	5/100	” 1/20	”	”	”	”	”
10	”	”	”	10/100	” 1/10	”	”	”	”	”
20	”	”	”	20/100	” 1/5	”	”	”	”	”
25	”	”	”	25/100	” 1/4	”	”	”	”	”
50	”	”	”	50/100	” 1/2	”	”	”	”	”
100	”	”	”	100/100	” 1	thing.				

1/2 of any one thing is 50 % of that thing
1/4 " " " " " 25 oteo " " "
1/5 " " " " " 20 " " " "
1/10 " " " " " 10 " " " "
1/20 " " " " " 5 " " " "
1/25 " " " " " 4 " " " "
1/50 " " " " " 2 " " " "

100 : 2 % :: 1 : 2/100 or 1/50
100 : 4 " :: 1 : 4/100 " 1/25
100 : 5 " :: 1 : 5/100 " 1/20
100 : 10 " :: 1 : 10/100 " 1/10
100 : 20 " :: 1 : 20/100 " 1/5
100 : 25 " :: 1 : 25/100 " 1/4
100 : 50 " :: 1 : 50/100 = 1/2

If all the people were, as they actually are, divided into two classes, namely: the affirmative, or gainers, and the negative, or losers and they were but 200 people on earth; and to each person were given one dollar for one year the result at the end of the year would be, and actually forever is, as follows:

100% AFFIRMATIVE 100 PERSONS	100% NEGATIVE 100 PERSONS
49%, or 49 of the 100 will, in one year, add 1%, and have $1.01	49%, or 49 of the 100 will, in one year, lose 1%, and have $.99
17%, or 17 of the 100 will, in one year, add 2%, and have $1.02	17%, or 17 of the 100 will, in one year, lose 2%, and have $.98
8%, or 8 of the 100 will, in one year, add 3%, and have $1.03	8%, or 8 of the 100 will, in one year, lose 3%, and have $.97
5%, or 5 of the 100 will, in one year, add 4%, and have $1.04	5%, or 5 of the 100 will, in one year, lose 4%, and have $.96
4%, or 4 of the 100 will, in one year, add 5%, and have $1.05	4%, or 4 of the 100 will, in one year, lose 5%, and have $.95
2%, or 2 of the 100 will, in one year, add 6%, and have $1.06	2%, or 2 of the 100 will, in one year, lose 6%, and have $.94
2%, or 2 of the 100 will, in one year, add 7%, and have $1.07	2%, or 2 of the 100 will, in one year, lose 7%, and have $.93

1%, or 1 of the 100 will, in one year, add 8%, and have $1.08

1%, or 1 of the 100 will, in one year, add 9%, and have $1.09

1%, or 1 of the 100 will, in one year, add 10%, and have $1.10

1%, or 1 of the 100 will, in one year, add 11% and have $1.11

1%, or 1 of the 100 will, in one year, add 12%, and have $1.12

1%, or 1 of the 100 will, in one year, add 14%, and have $1.14

1%, or 1 of the 100 will, in one year, add 16%, and have $1.16

1%, or 1 of the 100 will, in one year, add 20%, and have $1.20

1%, or 1 of the 100 will, in one year, add 25%, and have $1.25

1%, or 1 of the 100 will, in one year, lose 8%, and have $.92

1%, or 1 of the 100 will, in one year, lose 9%, and have $.91

1%, or 1 of the 100 will, in one year, lose 10%, and have $.90

1%, or 1 of the 100 will, in one year, lose 11%, and have $.89

1%, or 1 of the 100 will, in one year, lose 12%, and have $.88

1%, or 1 of the 100 will, in one year, lose 14%, and have $.86

1%, or 1 of the 100 will, in one year, lose 16%, and have $.84

1%, or 1 of the 100 will, in one year, lose 20%, and have $.80

1%, or 1 of the 100 will, in one year, lose 25%, and have $.75

1%, or 1 of the 100 will, in one year, add 33⅓%, and have $1.33⅓

1%, or 1 of the 100 will, in one year, add 50%, and have $1.50

1%, or 1 of the 100 will, in one year, add 100%, and have $2.00

1%, or 1 of the 100 will, in one year, lose 33⅓%, and have $.66-2/3

1%, or 1 of the 100 will, in one year, lose 50%, and have $.50

1%, or 1 of the 100 will, in one year, lose 100%, and have not

The above table is true for all time. It can be carried closer by bringing it down to fractions of the oteo gained or lost, but generally the above are near enough to illustrate the importance of a knowledge of percentage.

ITEU.

Interest.

Oteo Iteu.

Per cent Interest.

Interest, iteu, is the money that money makes.

It is a financial percentage of gain.

Oteom prevails in all things, hence in money matters as in all else. Percentage and interest are not the same.

Interest is financial percentage, but percentage is not interest.

There are various ways of making money. One, and the chief, is a government's credit that allows it to stamp and manufacture money based on various taxes and revenues. The main object of governmental power is the creation of credit that will enable it to manufacture money that can become generally accepted. It has the monopoly in this product. Another is through nature's gifts, for which seldom thanks are returned but which are powerful factors in money making, namely: providing habitation, food and clothing. Any power that can furnish these three to the people is supreme over all.

Another, is from the sale of merchandise, and is called profits.

Another is the money made by professional and personal services, in fees, salaries and wages. An-

other, comes from trades and physical labor. Another, and not the least productive, is the eleemosynary methods, now being very skillfully practiced, and called charities, emoluments and endowments.

Another, the most powerful, the most dangerous and the most cruel is the unfair and iniquitous advantage capital takes over labor in the high rates of interest on money loaned, and in dividends on stock purchased by money. Money should in all fairness never be permitted under any circumstances to make more than ten per cent per annum in any possible transaction.

The more money makes money the less other pursuits will make it. And as long as the capitalist possesses this tremendously unfair advantage over labor war between the two will rightly continue.

If Cho Momo can help " one of the least of these" to higher, purer, truer and nobler things it has filled its mission.

Interest should be paid for one day as though it were a month, and thirty days should be allowed for the financial month regardless whether the calendar month is long or short.

Interest should be paid on any portion of one dollar, even though it is only one cent, as though it were an entire one dollar. The time and labor for separate calculation for parts of one dollar require this allowance.

Cho Momo presents the following table for interest.

Time	$1.00 at 1% bi a *a* bi oteo		$1.00 at 2% di oteo		$1.00 at 3% fi oteo		$1.00 at 4% gi oteo		$1.00 at 5% ki oteo	
	1%	bi oteo	2%	di oteo	3%	fi oteo	4%	gi oteo	5%	ki oteo
1 day or 1 month	.0005	½ mill bi die u	.001	1 mill bi u	.0015	1 mill ½ mill bi u bi die u	.002	2 mills di u	.0025	2 mills ½ mill di u bi die u
2 months	.001	1 mill bi u	.002	2 mills di u	.003	3 mills fi u	.004	4 mills gi u	.005	5 mills ki u
3 months	.002	2 mills di u	.004	4 mills gi u	.006	6 mills li u	.008	8 mills ni u	.01	1 cent bi o

4 months	.003	3 mills fi u	.006	6 mills li u	.009	9 mills pi u	.012	1 cent 2 mills bi o di u	.015	1 cent 5 mills bi o ki u
5 months	.004	4 mills gi u	.008	8 mills ni u	.012	1 cent 2 mills bi o di u	.016	1 cent 6 mills bi o li u	.02	2 cents di o
6 months	.005	5 mills ki u	.01	1 cent bi o	.015	1 cent 5 mills bi o ki u	.02	2 cents di o	.025	2 cents 5 mills di o ki u

7 months	.0055	5 mills ½ mill ki u bi die u	.011	1 cent 1 mill bi o bi u	.0165	1 cent 6 mills ½ mill fi o li u bi die u	.022	2 cents 2 mills di o di u	.0275	2 cents 7 mills ½ mill di o mi u bi die u
8 months	.006	6 mills li u	.012	1 cent 2 mills bi o di u	.018	1 cent 8 mills bi o ni u	.024	2 cents 4 mills di o gi u	.03	3 cents fi o
9 months	.007	7 mills mi u	.014	1 cent 4 mills bi o gi u	.021	2 cents 1 mill di o bi u	.028	2 cents 8 mills di o ni u	.035	3 cents 5 mills fi o ki u

10 months	.008	8 mills ni u	.016	1 cent 6 mills bi o li u	.024	2 cents 4 mills di o gi u	.032	3 cents 2 mills fi o di u	.04	4 cents gi o
11 months	.009	9 mills pi u	.018	1 cent 8 mills bi o ni u	.027	2 cents 7 mills di o mi u	.036	3 cents 6 mills fi o li u	.045	4 cents 5 mills gi o ki u
12 months	.01	1 cent bi o	.02	2 cents di o	.03	3 cents fi o	.04	4 cents gi o	.05	5 cents ki o

Time	$1.00 at 6% bi a *a* li oteo		$1.00 at 7% bi a *a* mi oteo		$1.00 at 8% bi a *a* ni oteo		$1.00 at 9% bi a *a* pi oteo		$1.00 at 10% bi a *a* ao oteo	
1 day										
1 month	.003	3 mills fi u	.0035	3 mills ½ mill fi u bi die u	.004	4 mills gi u	.0045	4 mills ½ mill gi u bi die u	.005	5 mills ki o
2 months	.006	6 mills li u	.007	7 mills ni u	.008	8 mills ni u	.009	9 mills pi u	.01	1 cent bi o
3 months	.012	1 cent 2 mills bi o di u	.014	1 cent 4 mills li o gi u	.016	1 cent 6 mills bi o li o	.018	1 cent 8 mills bi o ni u	.02	2 cents di o

4 months	.018	1 cent 8 mills bi o ni u	.021	2 cents 1 mill di o bi u	.024	2 cents 4 mills di o gi u	.027	2 cents 7 mills di o mi u	.03	3 cents fi o
5 months	.024	2 cents 4 mills di o gi u	.028	2 cents 8 mills di o ni u	.032	3 cents 2 mills fi o di u	.036	3 cents 6 mills fi o li u	.04	4 cents gi o
6 months	.03	3 cents fi o	.035	3 cents 5 mills fi o ki u	.04	4 cents gi o	.045	4 cents 5 mills gi o ki u	.05	5 cents ki o

7 months	.033	3 cents 3 mills fi o fi u	.0385	3 cents 8 mills ½ mill fi o ni u bi die u	.044	4 cents 4 mills gi o gi u	.0485	4 cents 8 mills ½ mill gi o ni u bi die u	.055	5 cents 5 mills ki o ki u
8 months	.036	3 cents 6 mills fi o li u	.042	4 cents 2 mills gi o di u	.048	4 cents 8 mills gi o ni u	.054	5 cents 4 mills ki o gi u	.06	6 cents li o
9 months	.042	4 cents 2 mills gi o di u	.049	4 cents 9 mills gi o pi u	.056	5 cents 6 mills ki o li u	.063	6 cents 3 mills li o fi u	.07	7 cents mi o

10										
months	.048	4 cents 8 mills gi o ni u	.054	5 cents 4 mills ki o gi u	.064	6 cents 4 mills li o gi u	.072	7 cents 2 mills mi o di u	.08	8 cents ni o
11										
months	.054	5 cents 4 mills ki o gi u	.063	6 cents 3 mills li o fi u	.072	7 cents 2 mills mi o di u	.081	8 cents 1 mill ni o bi u	.09	9 cents pi o
12										
months	.06	6 cents li o	.07	7 cents mi o	.08	8 cents ni o	.09	9 cents pi o	.10	10 cents ao o

MEASURES.

A foundation is now made sufficiently strong for the creation of a system of measures or standards.

The ordinary affairs of life must be conducted to conform with some established rule.

It is the especial province of arithmetic, which it yields to no other branch of mathematics, to form the several necessary standards.

Linear, or Long Measure.

This measure is used for distances, generally geographic or those that pertain to the surface of the earth. Geometrical distances have another scale.

The generally accepted table is as follows:

12	inches	make 1	foot
3	feet	" 1	yard
5-1/2	yards	" 1	rod, or pole
40	rods	" 1	furlong
8	furlongs	" 1	mile
3	miles	" 1	league
69-1/4	"	" 1	degree of the equator
360	degrees	" 1	great circle of the earth

The above, expressed in Cho language, is as follows:

ad cei	(12 inches)	ke	(=)	bi dei	(1 foot)
fi dei	(3 feet)	ke	"	bi ei	(1 yard)
ki de bi die ei	5½ yards)	ke	"	bi fei	(1 rod)
do fei	(40 rods)	ke	"	bi gei	(1 furlong)
ni gei	(8 furlongs)	ke	"	bi hei	(1 mile)
fi hei	(3 miles)	ke	"	bi kei	(1 league)
*a*p de bi gie kei	(69¼ leagues)	ke	"	bi lei	(1 degree)
fi *a*o lei	(360 degrees)	ke	"	bi mei	(1 great circle)

The above can be arranged conveniently as follows:

cei dei
inches ft.
ad ke bi . ei
12 = 1 . yd.
il ke fi ke bi .fei
36 = 3 = 1 .yds.
bi pin ke al de ke ki de ke bi.
bi die bi die . gei
198 = 16½ = 5½ = 1. furlongs
mipeo ke li*a*o ke dieo ke do ke bi. hei
7920 = 660 = 220 = 40 = 1. miles
liif*a*o ke udnio ke am*a*o ke fieo ke ni ke bi. kei
63360 = 5280 = 1760 = 320 = 8 = 1. leagues
ap*oo*nio ke biundo ke udnio ke pi*a*o ke eg ke fi ke bi. lei
190080 = 15840 = 5280 = 960 = 24 = 3 = 1. degrees
finioal*oo* ke iban*oo* ke aoul*oo* ke bipid*oo* ke ginio ke *a*o ke bi. mei
3801600 = 316800 = 105600 = 19200 = 480 = 60 = 1. the great circle of the earth

$$1368576000 = 114048000$$

$$38016000 = 6912000$$

$$172800 = 21600$$

$$360 = 1.$$

SQUARE MEASURE.

The unpremeditated invective against the gross ignorance shown by every arithmetic published leaves language barren before the following astonishing table.

The accepted table for square measure.

144	square	inches	make	1	square	foot
9	"	feet	"	1	"	yard
30¼	"	yards	"	1	"	rod
40	"	rods	"	1	rood	
4	"	roods	"	1	acre	
40	perches		"	1	acre	
640	acres		"	1	square	mile

144 square inches make 12 square feet, not 1

9 square feet make 3 square yards, not 1

144 line, or ordinary inches make 1 square foot

12 square inches make 1 square foot.

9 yards make 1 square yard, but 9 square yards are 81 yards and they make 9 square yards, not 1.

Why not say, equally wrongly, that 640 square acres make 1 square mile?

By what right and authority are such blunders made and where is the discernment of governments that justify such mistakes?

The above named table of "square measure" is wholly wrong and is utterly useless. It should have no place in any scholar's mind and should be ignored by all. The student that aspires to ability in mathematics has no space for such dull tools.

Yet, not content with that egregious error, they add the following nonsensical meter table:

A square	millimeter	= 0.000001	of a square meter.
"	centimeter	= 0.0001	" " " "
"	decimeter	= 0.01	" " " "
"	meter	= Principal Unit.	
"	dekcameter	= 100	square meters.
"	hektometer	= 10000	" "
"	myriameter	= 1000000	" "

Observe the 0 placed at the left of a decimal point. The cipher so placed is expressive of nonentity, of imbecility, of inexcusable ignorance. A mathematician has no right to so use the 0 as above than a man of culture has the right to profane language by the expression "who to," instead of "to whom."

The expression "principal unit" is a technical, not a mathematical term, and is wholly incomprehensible. They could not easily square 39.37, which, squared would give the horrible combination of

39.37
39.37

27559
10911
35433
10911

1459.0969

There is not a possible mathematical problem that requires such extremely high or low numbers: and if required would not use a square metric system in the acquisition.

Properly there is no such thing in mathematics as a square meter, any more than there is a square root. Any series of numbers can be squared without the worthless and cumbersome metric square.

Let this go the way of other useless matter into oblivion.

CONSTRUCTION.

The Square Measure.

The square measure is wholly for surfaces, especially of land.

Surfaces have two dimensions hence are squares.

In land purchases the depth into the soil goes to a certain allowed number of feet by permission and not through actual right of purchase. The purchaser has bought only the surface and the government or state rightly retains title to the inner contents of the soil beyond the certain allowed number of feet that are to be used for building, farming, etc. The mineral, or oil beyond these allowed number of feet is retained by the government and is granted under certain other rights than those of purchase of surface.

The following square, or surface measure is a necessity for conducting the ordinary affairs of life.

12	square inches	(144 inches)	= 1 sq. foot
3	" feet	(9 feet, or 1596 in.)	= 1 sq. yard
5-9/16	" yards	(30 1/4 yards, 39204 inches)	= 1 sq. rod
6-4/6	" rods	(40 rods)	= 1 sq. rood
2	" roods	(4 roods)	= 1 sq. acre
25-17/20	" acres	(640) acres)	= 1 sq. mile

Hence, as a matter of convenience(an important item in mathematics) the above is given as follows:

144	inches	= 1	square	foot
9	feet	= 1	"	yard
30¼	yards	= 1	"	rod, or pole
40	rods	= 1	"	rood
4	roods	= 1	"	acre
640	acres	= 1	"	mile

The above square, or surface measure is expressed in Cho language as follows:

biog	cei	ke	bi dea
144	inches	=	1 sq. foot
pi	dei	ke	bi ea
9	feet	=	1 sq. yard
io ei de	bi gie	ke	bi fea
30¼	yards	=	1 sq. rod
do	fei	ke	bi gea
40	rods	=	1 sq. rood
gi	gei	ke	bi goa
4	roods	=	1 sq. acre
lido	goi	ke	bi hea
640	acres	=	1 sq. mile

One very important table, not previously provided, is for parts of an inch.

Should there ever in the future, in the progress of ability arise for microscopical work a peer of the great Leuukenhoek who could measure the length of a joint of a minute insect's leg, and who though living over one hundred years past has had no successor his equal, the scale for minute parts of an inch will be important.

The Inch, or Cei Scale.

12 marks	=	1 point	
ad bui	ke	bi boi	
12 points	=	1 dot	
ad boi	ke	bi bii	
12 dots	=	1 line	
ad bii	ke	bi bei	
12 lines	=	1 inch	
ad bei	ke	bi cei	

cei	bei	bii	boi	bui
inch	line	dots	points	marks
			1 =	12
		1 =	12 =	144
	1 =	12 =	144 =	1728
1 =	12 =	144 =	1728 =	20736

THE CUBIC MEASURE.

The cleaning of King Augeus' stables is not a pleasing task, but since only Hercules could do it, it was for Hercules alone to do it.

Look at the cubic measures the blind, dull oxen have brought into the stable. How foul they are!

"CUBIC OR SOLID MEASURE"

1728	cubic	inches	make	1	cubic foot
27	"	feet	"	1	" yard
20	"	"	"	1	ton
16	"	"	"	1	cord foot
8	cord	"	"	1	cord of wood

In the first place the cube has nothing to do with solids. It is wholly and alone for space; regardless of the contents.

If 1728 cubic inches were placed in line one inch high and one inch broad they would extend a distance of over 40 miles!

If 20 cubic feet were collected at one place the space occupied would be greater than that of the Capitol at Washington, D. C.

And think of the expression cubic yards. "27 cubic feet make 1 cubic yard!"

The cube is so great in space that calculations in it beyond feet leads to brain fatigue.

There is not an architect existing capable of constructing a building covering a space of 1728 cubic inches.

Sweep this cubic measure out with the other useless matter.

THE CUBIC METER!

Hidden in one stall is the following:

"A	cubic	millimeter	=	0.000000001	of	a	cubic meter.
"	cubic	centimeter	=	0.000001	"	"	" "
"	"	decimeter	=	0.001	"	"	" "
"	"	meter	=	Principal Unit			"

Out with it!

METRIC SYSTEM.

The Meter

The Cho E System.

Mathematicians, not content with the common sense linear table, devised in an evil hour the following monstrosity.

"10 millimeters	make	1	centimeter
10 centimeters	"	1	decimeter
10 decimeters	"	1	meter
10 meters	"	1	decameter
10 decameters	"	1	hectometer
10 hectometers	"	1	kilometer
10 kilometers	"	1	myriameter"

And as though that is not enough to drive one insane they add this "intolerable complication."

"1 millimeter = 0.0397 inches nearly
1 centimeter = 0.3937 "
1 decimeter = 3.9370 "
1 meter = 39.37 " 3.280833 ft.
1 decameter = 32 ft. 9.7 "
1 hectometer = 19 rds. 14 ft. 7 inches
1 kilometer = 4 furlongs 38 rds. 13 ft. 10 inches
1 myriameter = 6 mi. 1 fur. 28 rds. 6 ft. 4 inches"

Please observe the redundant 0 in 3.9370! Is there any possible excuse for that?

Can any man make a living from the use of such figures?

This centimeter is a centiped carrying death in its tentacles.

For ingenuity of pure cussedness the devising as a standard for measuring distances the horrible number "39.37 inches nearly" takes the laurel crown.

This 39.37 is difficult to multiply and impossible to divide. Why (since figures will sometimes lie) did they not, for the good of their fellows, practice a virtue and call its 39.36?

Whence came the hyenously cruel "39.37 inches nearly?"

They say, "39.37 inches nearly" are the one tenth millionth of the distance between the equator and the north pole! If they had said "39.37 inches nearly" are the one millionth of the distance between hades and happiness we who know full well the one could imagine the other destination, but the one tenth millionth of the distance between the equator and the north pole is beyond one's capacity.

Prior to especially describing the three equators and the four north, and the four south poles, Cho Momo establishes herewith a metric system that will be readily responsive to any demand.

The meter is 40 inches.

In the common linear measure 1 yard is 36 inches.

With the numbers 36 and 40 comparisons can be easily made. 36 is 9/10 of 40, and 40 is 10/9 of 36.

The Cho E, or Metric System is as follows:

Ae (billimeter) ke gi	a*o*e	.004 of an inch	
Be (millimeter) " "	bi*o*e	.04 " " "	
Ce (centimeter) " "	aoe	.4 " " "	
De (decimeter) " "	cei	4.	inches

E (meter)	" do "	40.	"
Fe (decameter)	" giko "	400.	"
Ge (hectometer)	" oko "	4000.	"
He (kilometer)	" gilo "	40000.	"
Ie (myriameter)	" olo "	400000.	"

Any of the above can be more clearly defined by the use of the word cho, thus: for kilometer, cho he: for centimeter, cho ce: for meter, cho e.

Ae ke	.004	4/1000	1/250 of an inch
Be "	.04	4/100	1/25 " " "
Ce "	.4	4/10	
De "	4.	inches	
E "	40.	1 yard and 4 inches	
Fe "	400.	11 yards " " "	
Ge "	4000.	111 " " " "	
He "	40000.	1111 " " " "	
Ie "	400000.	11111 " " " "	

Investigate the results of the magic forty inches as the meter standard and the demonstration proves that it is the one only right number for that standard, regardless whether it is a part of the distance from the center of the earth to the zenith, or not. The only wonder is that it waited the coming of the Cho Momo to show this clearly evident fact.

E	(meter) •	ke	40 inches	1 yard 4 inches
Fe	(decameter)	"	400 "	2 rds. 4 "
Ge	(hectometer)	"	4000 "	2 " 1 yard 4 inches
He	(kilometer)	"	40000 "	5 furlongs 5 rds. 10 yards
Ie	(myriameter)	"	400000 "	6 miles 2 fur. 2 rds. 1 yd. 4 in.

In the above exists an exactitude that is wonderful, grand and inspiring! Truly, truth is stranger than fiction and is not nearly as common.

THE FOUR NORTH POLES
AND
THE THREE EQUATORS.

Descriptions of the geometric, the geographic, and the two north magnetic, with the corresponding south poles and the three equators, namely, the geometric, the geographic, and the previously unknown, electric, equators are reserved for Part II of Cho Momo.

THE LITER.

Suspecting perhaps that truth would some day detect the lie they pronounce it leeter; and not satisfied, they spell it "liter" or "litre."

They give the following:

"Base, 1 liter = the cube or the decimeter = 61.023373 cubic inches = a little more than a wine quart."

Can any sane person understand the above?

What is a wine quart?

What is the mathematical value of the words: "a little more than?"

They say: "The unit for the measure of volume is the cube whose edge is one—tenth of the meter—that is, a cube whose edge is 3.937 inches. This cube is called a liter, and is one—thousandth part of the cube constructed on the meter, as an edge."

It is enough to make one dizzy!

Again this Cerberus, No. 3937, an emissary of Satan, the guardian of Hades, shows its fangs. One stronger than it is coming to capture, strangle and kill it.

Yet not content with that emanation of diseased brains they give the following:

1 milliliter	=	.061023	cubic inches
1 centiliter	=	.610234	" "
1 deciliter	=	6.102338	" "
1 liter	=	61.023378	" "
1 decaliter	=	610.233779	" "
1 hectoliter	=	6102.337795	" "
	=	3.5314454	cubic feet
1 kiloliter	=	61023.377953	" inches
	=	35.314454	" feet

Can any one read that table without the feeling of approaching insanity?

And to make the downward road easier they use identically the same terms for a wholly different table called:

THE DRY MEASURE.

"Since" (they say) "1 bushel = 2150.4 cu. in. = 1 pk. = 537.6 cu. in.
1 qt. = 67.2 cu. in. = 1 pt. = 33.6 cu. in.
therefore:

" 1 milliliter = .001816 pints
1 centiliter = .018161 "
1 deciliter = .181611 "
1 liter = 1.816112 "
1 decaliter = 1 pk. 1.08056 qt.
1 hectoliter = 2 bu. 3 pks. 2 qts. 1.0112 pt.
1 kiloliter = 28 bu. 1 pk. 4 qts. 0.112 pt.

And for what they call

THE WINE OR LIQUID MEASURE

(using identically the same terms as in the two previous tables):

" 1 milliliter = 0.008453 gills
1 centiliter = .084534 "
1 deciliter = .845345 "
1 liter = 1 qt. 11336 pts.
1 decaliter = 2 gals. 2 qts. 1 pt. .1336 gill
1 hectoliter = 26 gals. 1 qt. 1 pt. 1.344 gills
1 kiloliter, or stere = 1 tun, 12 gals. 0 qt. 1 pt. 1.44 gills."

Such horrible tables will do for the place whence Cerberus came, but they are not suitable for this fair earth of ours.

LIQUID OR WINE MEASURE.

4 gills	make	1 pint
2 pints	"	1 quart
4 quarts	"	1 gallon
63 gallons	"	1 hogshead
2 hogsheads	"	1 pipe, or butt
2 pipes	"	1 tun

Which put into Cho is:

gi ta	ke bi	te
4 gills	=	1 pint
di te	ke bi	ti
2 pints	=	1 quart
gi ti	ke bi	to
4 quarts	=	1 gallon
*a*f to	ke bi	tu
63 gallons	=	1 hogshead
di tu	ke bi	t*a*
2 hogsheads	=	1 pipe
di t*a*	ke bi	t*a*n
2 pipes	=	1 tun

THE DRY MEASURE.

2 pints	make	1 quart
8 quarts	"	1 peck
4 pecks	"	1 bushel

In Cho it is:

di	te	ke	bi	ti
2	pints	=	1	quart
ni	ti	ke	bi	tim
8	quarts	=	1	peck
gi	tim	ke	bi	tom
4	pecks	=	1	bushel

MEASURE OF TIME.

60	seconds	make	1 minute
60	minutes	"	1 hour
24	hours	"	1 day
7	days	"	1 week
4	weeks	"	1 month
12	months	"	1 year
365-1/4	days	"	1 year

This in Cho language is:

*a*o	ha	ke bi	he
60	seconds	=	1 minute
*a*o	he	ke bi	hi
60	minutes	=	1 hour
eg	hi	ke bi	ho
24	hours	=	1 day
mi	ho	ke bi	hu
7	days	=	1 week
gi	hu	ke bi	h*a*
4	weeks	=	1 month
ad	h*a*	ke bi	h*a*m
12	months	=	1 year
fi	*a*k de bi gio	ho ke bi	h*a*m
365	and 1/4	days	1 year

CIRCULAR MEASURE.

60 seconds make 1 minute
60 minutes " 1 degree
30 degrees " 1 sign
12 signs " the circle of the zodiac

This in Cho is:

*a*o ha ke bi he
60 seconds = 1 minute
*a*o he ke bi leim
60 minutes = 1 degrees
io leim ke bi seim
30 degrees = 1 sign
ad sein ke bi meim
12 signs = the circle of the zodiac

THE AVOIRDUPOIS TABLE.

This is a most important and useful scale.

16 drams	make	1	ounce
16 ounces	"	1	pound
25 pounds	"	1	quarter
4 quarters	"	1	hundred weight
20 hundred weights	"	1	ton

The avoirdupois in the Cho language is as follows:

al la	ke bi le		
16 drams	=	1	ounce
al le	ke bi li		
16 ounces	=	1	pound
ek li	ke bi lo		
25 pounds	=	1	quarter
gi lo	ke bi lu		
4 quarters	=	1	hundred weight
eo lu	ke bi l*a*		
20 hundred weights	=	1	ton

Cho Momo herewith creates a new table, to be known as the Gom table, or scale. It refers to parts of a grain.

ao	gigom	ke	bi	figom
10	”	=	1	”
ao	figom	ke	bi	digom
10	”	=	1	”
ao	digom	ke	bi	gom
10	”	=	1	”
ao	gom	ke	bi	goma
10	”	=	1	grain

The Troy, or Mint weight is for gold, silver, radium, platinum, etc.

It is as follows:

10	gom	make	1 grain
24	grains	”	1 penny weight
20	penny weights	”	1 ounce
10	ounces	”	1 pound

The above placed in Cho language is as follows:

ao	gom	ke	bi	goma
10	”	=	1	grain
eg	goma	ke	bi	lam
24	grains	=	1	penny weight
eo	lam	ke	bi	lem
20	penny weights	=	1	ounce
ao	lem	ke	bi	lim
10	ounces	=	1	pound

THE GRAM TABLE.

Arithmetical authorities give the following unworkable table, saying the base is one gram, and making the gram equal “the weight of a cubic

centimeter of rain water," which, they say, equals " 15.432 grains, Troy, nearly," and equals ".0352745 ounces, avoirdupois nearly."

Why not have said: the cubic centimeter of moon-shine, or the one tenth millionth of the weight of the atmosphere lying between the equator and the north pole?

What is the mathematical value of the word, " nearly?"

The Gram table is the following ridiculous mess.

" EQUIVALENTS IN AVOIRDUPOIS AND TROY WEIGHT."

" 1 milligram	=	0.0154	grains	Troy
1 centigram	=	0.1543	"	"
1 decigram	=	1.5432	"	"
1 gram	=	15.4327	"	"
1 decagram	=	0.3527	ounce	Avoirdupois
1 hectogram	=	3.5274	"	"
1 kilogram	=	2.2046	pounds	"
1 myriagram	=	22.046	"	"
1 quintal	=	220.46	"	"
1 millier, or ton	=	2204.6	"	" "

The above table is hereafter at auction to the lowest bidder. Cho Momo has no use for such stuff.

A Coal, Sand, Brick, etc., Scale.

Any of the above should be calculated at a standard of ten dollars ($10.00) for one ton of 2,240 pounds.

If coal were at $5.00 per ton, the cost would be 5/10 of any of the prices established in the following scale.

The Cho word for ton, or tons, is l*a;* and that for pound, or pounds, is li.

eddo	li	ke	bi	l*a*	*a*	ao	a
2240	pounds	=	1	ton	at	$10.	dollars
ebeo	li	ke	bi	die l*a*	*a*	ki	a
1120	pds.	=	1/2	ton	at	$5.	dollars
ki*a*o	li	ke	bi	gie l*a*	*a*	di de bi die	a
560	pds.	=	1/4	ton	at	$2.50	dollars
dinio	li	ke	bi	gie l*a*	*a*	bi de bi gie	a
280	pds.	=	1/4	ton	at	$1.25	dollars
bido	li	ke	bi	ale l*a*	*a*	an	a
140	pds.	=	1/16	ton	at	$.68	cents
mio	li	ke	bi	ide l*a*	*a*	ip	0
70	pds.	=	1/32	ton	at	$.39	cents
ik	li	ke	bi	*a*ge l*a*	*a*	eo	0
35	pds.	=	1/64	ton	at	$.20	cents
an	li	ke	bi	di ene l*a*	*a*	ao	0
18	pds.	=	1/128	ton	at	$.10	cents
pi	li	ke	bi	di ube l*a*	*a*	ki	0
9	pds.	=	1/256	ton	at	$.5	cents
ki	li	ke	bi	ki ade l*a*	*a*	fi	0
5	pds.	=	1/512	ton	at	$.3	cents

THE MONETARY OR OU SCALE.

Part I of Cho Momo closes with the simplest, the grandest, the most serviceable and best scale of all, namely: the Ou Table.

In comparison no other monetary table can equal that universally used by the people of the United States of America. Perhaps no other one element has been as instrumental in creating the wonderful prosperity of the people of that government as its simple decimal financial table: and positively, providing the remarkable utility of this table is admitted, no government can hope to survive in the struggle for existence that does not arrange its finance in accord with this simple scale.

THE MONETARY TABLE.

10 mills make 1 cent
10 cents " 1 dime
10 dimes " 1 dollar

In the universal Cho commercial language the above is:

ao u ke bi 0
10 mills = 1 cent
ao o ke bi i
10 cents = 1 dime
ao i ke bi a
10 dimes = 1 dollar
di (apples) t*a* ki 0
ki t*a* di 0

EPILOGUE.

Cho Momo entered the arena finding the field crowded with wildly running contestants.

One look swept the sands of all that rubbish.

Cho Momo now leisurely walks alone challenging an equal, and ready to submit to a superior.

He who can do better than Cho Momo herein presents has riches, honors and fame for rewards. Ability asks no permission: it dares and does.

Study Cho Momo and get ability to dare and do.

PRONUNCIATION.

The author of Cho Momo literally copies the words given in Prof. Alex. Melville Bell's *Visible Speech* as the highest and best authority on linguistic sounds extant.

A	as	a	in	age	
	"	ai	"	aim	
	"	ao	"	gaol	
	"	ua	"	guage	
	"	ay	"	day	
	as	aye	in	aye	
	"	ea	"	steak	
	"	ei	"	vein	
	"	ey	"	obey	
	"	eye	"	preyed	
E	as	e	in	eve	
	"	ea	"	eat	
	"	ee	"	see	
	"	e'e	"	e'en	
	"	ei	"	conceive	
	as	eo	in	people	
	"	ey	"	key	
	"	eye	"	keyed	
	"	i	"	fatigue	
	"	ie	"	field	
I	as	eigh	in	height	
	"	eye	"	eye	
	"	i	"	time	
	"	ie	"	tie	
	as	igh	in	nigh	
	"	ui	"	guide	
	"	uy	"	buy	
	"	y	"	by	
			as	ye in rye	
O	as	aut	in	hautboy	
	"	eau	"	beau	
	"	eo	"	yeoman	
	"	eu	"	shew	
	"	ewe	"	sewed	
	"	o	"	old	
	as	oa	in	oak	
	"	oe	"	foe	
	"	oo	"	brooch	
	"	ou	"	soul	
	"	ow	"	crow	
	"	owe	"	owed	

U	as eu	in rheum	as oo	in bloom
	" ew	" grew	" ooe	" wooed
	" ewe	" brewed	" ou	" through
	" o	" do	" u	" rule
	" oe	" shoe	" ue	" rue
	" oeu.	" manoeuvre	" ui	" fruit

as wo in two

O, o,	as a	in all	as aw	in saw
	" au	" fraught, laud, naught	" awe	" awed
A, a,	as ar	in hard	as ear	in heart
	" er	" clerk	" uar	" guard

as a in father

In printing, an italic letter is used to express an underscored written character.

C	as c	in cell	as se	in science
	" ce	" ice	" sch	" schism
	" ps	" psalm	" se	" base
	" s	" sale	" ss	" loss
G	as gu	in guide		

The other consonants are pronounced as commonly used.

A consonant makes one syllable with its preceding vowel, thus: ab; but if followed by a vowel it drops the first vowel and forms another syllable with the succeeding vowel, thus: a be.

The accent is always on the first syllable with words of two or three syllables: and on the antepenult with words of more than three syllables.

CHO VOCABULARY.

A	Dollars
(D)a	Root of square
Ad	Forms the possessive case
Ae	Billimeter
Adil	Abstract numbers
Amomo	Abstract arithmetic
A*o*n	All the fingers
A	At
(D)*a*	Root of cube
*A*dil	Concrete numbers
*Al*a	Arabic
*A*momo	Concrete arithmetic
Be	Millimeter
Bei	Bei
Bib	Prime numbers
Bid	Composite numbers
Bidil	Masculine numbers
Bii	Bii
Boi	Boi
Bu	Parentheses
Bua	1st parentheses
Bue	2d parentheses
Bui	3d parentheses
Buo	4th parentheses
B*o*n	Left index finger

Ce	Centimeter
Cei	Inch
Cho	One
Cho E	Meter
Chom	Magnetism
Cho Momo	The one arithmetic
De	And
De	Decimeter
Dem	Linear measure
Dil	Numbers
Dile	Ordinal numbers
Dili	Cardinal numbers
Digom	Digom
Dim	Whole numbers
Dime	Fractions
Dimi	Numerator
Dimo	Denominator
Dimu	Mixed numbers
D*o*n	Left long finger
E	Meter
Ei	Yard
Ea	Square yard
Eom	Immaterial
Eon	Material
Fe	Decameter
Fei	Rod
Fea	Square rod
Figom	Figom
F*on*	Left ring finger

Ge	Hectometer
Gei	Furlong
Gea	Square furlong
Gigom	Gigom
Gom	Gom
Goma	Grain
G*o*m	Left little finger
Ha	Seconds
He	Kilometer
He	Minute
Hei	Mile
Hea	Square mile
Hi	Hour
Him	Time
Ho	Day
Hu	Week
H*a*	Month
H*am*	Year
I	Dimes
Ie	Myriameter
Ike	Equivalent
Iteu	Interest
Kal	What
Ke	Equal, makes, is, are
Kei	League
Ko	Vacuum
Koad	Co aid
Kon	Right little finger

K*a*	Environment
K*a*om	Electricity
La	Dram
Lak	Price, cost of anything
Lam	Pennyweight
Le	Ounce
Leim	Degree
Lem	Ounce
Li	Pound
Lim	Pound
Lo	Quarter
Lu	Hundredweight
Lu	This, these
Luad	Their
L*o*n	Right companion finger
L*a*	Ton
Mei	Circle of earth
Meim	Circle of zodiac
Momo	Arithmetic
M*o*n	Right long finger
Mu	That, those
Muad	Their
Mule	Mule
Muli	Muli
Muod	Them, of them
Nid*a*	Cube 8 of root 2
N*o*n	Right index finger
N*o*t	Naught

Nu	Units, unit
Nua	Square
Nu*a*	Cube
O	Center
O	Cents
O	Cipher, zero, naught
Od	Forms objective case
Odil	Feminine numbers
On	Imponderable.
Oteo	Per cent.
Oteom	Percentage
Ou	Money
*O*n	Left thumb
Pib	Name of the Pib division
Pibo	1st section of the division
Pido	2d section of the division
Pifo	3d section of the division
Pigo	4th section of the division
Piko	5th section of the division
Pilo	6th section of the division
Pimo	7th section of the division
Pino	8th section of the division
Pipo	9th section of the division
Pito	10th section of the division
P*o*n	Right thumb
Pu	Plus
Pua	Magnets
Pume	Addition of fractions
Puum	Addition
Puo	Sum

Rateo	Ratio
Ru	Subtrahend
Ru	Minus
Rui	Minuend
Ruo	Difference
Rume	Subtraction of fractions
Ruum	Subtraction
Seim	Sign
Su	Multiplier
Sua	Factors
Sui	Multiplican
Sume	Multiplication of fractions
Suo	Product
Suum	Multiplication
Ta	Gill
Te	Pint
Ti	Quart
Tim	Peck
To	Gallon
Tom	Bushel
Tua	Electrics
Tui	Dividend
Tuo	Quotient
Tume	Division of fractions
Tuum	Division
T*a*	For
Tu	Hogshead
Tu	Divisor

T*a*	Pipe
T*a*n	Tun
Tu*a*	Remainder
U	Mills

ENGLISH VOCABULARY.

Addition	Puum
Addition of fractions	Pume
And	De
Arabic	*A*l*a*
Arithmetic	Momo
Arithmetic, the one	Cho Momo
Arithmetic, abstract	Amomo
Arithmetic, concrete	*A*momo
*A*t	*a*
Billimeter	Ae
Bushel	Tom
Cardinal numbers	Dili
Center	O
Centimeter	Ce
Cents	O
Cipher	O
Circle of the earth	Mei
Circle of the zodiac	Meim
Co aid	Koad
Cube	Nu*a*

Cube 8	Nid*a*
Cube, root of	(D)*a*
Day	Ho
Decimeter	De
Decameter	Fe
Difference	Ruo
Degree	Lei
Degree	Leim
Denominator	Dimo
Digom	Digom
Dimes	I
Dividend	Tim
Division	Tuum
Division of fractions	Tume
Divisor	Tu
Dollars	A
Dram	La
Electrics	Tua
Electricity	K*a*om
Environment	K*a*
Equality	Ke
Equal to	Ke
Equivalent	Ike
Factors	Sua
Fingers, all the	A*o*n
thumb, left	*O*n
index, left	B*o*n
long, left	D*o*n
ring, left	F*o*n

Fingers	
little, left	G*o*m
little, right	K*o*n
companion, right	L*o*n
long, right	M*o*n
index, right	N*o*n
thumb, right	P*o*n
Figom	Figom
Foot	Dei
Foot, square	Dea
Foot, cube	De*a*
For	T*a*
Fractions	Dime
Fractions, addition	Pume
Fractions, division	Tume
Fractions, multiplication	Sume
Fractions, subtraction	Rume
Gallon	To
Gigom	Gigom
Gill	Ta
Gom	Gom
Grain	Goma
Hectometer	Ge
Hogshead	Tu
Hours	Hi
Hundredweight	Lu
Immaterial	Eom
Imponderable	On
Inch	Cei

Interest	Iteu
Interrogation	Kal
Is	Ke
Kilometer	He
League	Kei
Magnets	Pua
Magnetism	Chom
Material	Eon
Meter	E. Cho E.
Metric system	Cho. E system
Mile	Hei
Mile, square	Hea
Millimeter	Be
Mills	U
Minuend	Rui
Minutes	He
Minus	Ru
Money	Ou
Month	Ha
Mule	Mule
Muli	Muli
Multiplication	Suum
Multiplication of fractions	Sume
Multiplican	Sui
Multiplier	Su
Myriameter	Ie
Numerator	Dimi
Numbers	Dil
Numbers, abstract	Adil

Numbers, concrete	*A*dil
Numbers, composite	Bid
Numbers, feminine	Odil
Numbers, masculine	Bidil
Numbers, mixed	Dimu
Numbers, ordinal	Dile
Numbers, prime	Bib
Objective case	Od
One	Cho
Ounce	Le
Ounce	Lem
Parentheses	Bu
1st parentheses	Bua
2d parentheses	Bue
3d parentheses	Bui
4th parentheses	Buo
Peck	Tim
Per cent	Oteo
Percentage	Oteom
Pint	Te
Pipe	T*a*
Plus	Pu
Pound	Li
Pound	Lim
Possessive case	Ad
Price, cost	Lak
Product	Suo

Quart	Ti
Quarter	Lo
Quotient	Tuo
Ratio	Rateo
Remainder	Tu*a*
Rod	Fei
Rod, square	Fea
Rood	Gei
Rood, square	Gea
Seconds	Ha
Square	Nua
Subtraction	Ruum
Subtraction of fractions	Rume
Subtrahend	Ru
Sum	Puo
That, those	Mu
Them, of them	Muad
This, these	Lu
Time	Him
Ton	L*a*
Tun	T*a*n
Vacuum	Ko
Week	Hu
What	Kal
Yard	Ei
Year	H*a*m

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